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AUGUST 1998

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Special Report

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MAC OS SPECIAL REPORT

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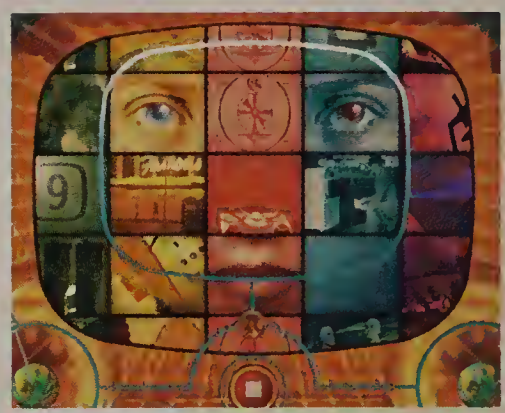

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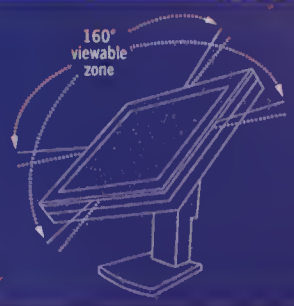

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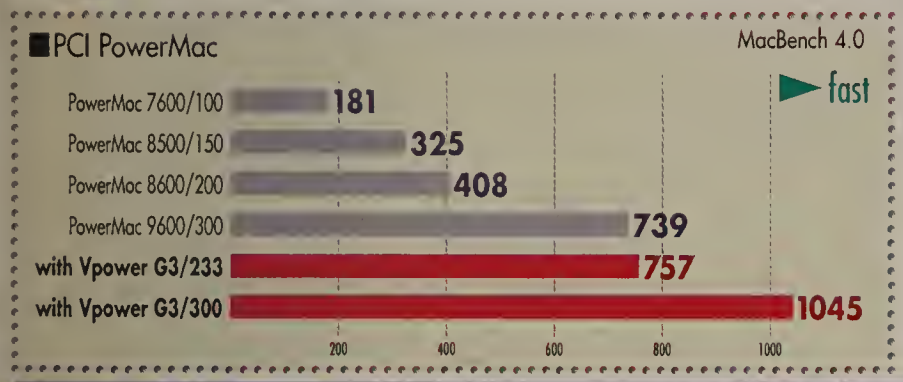

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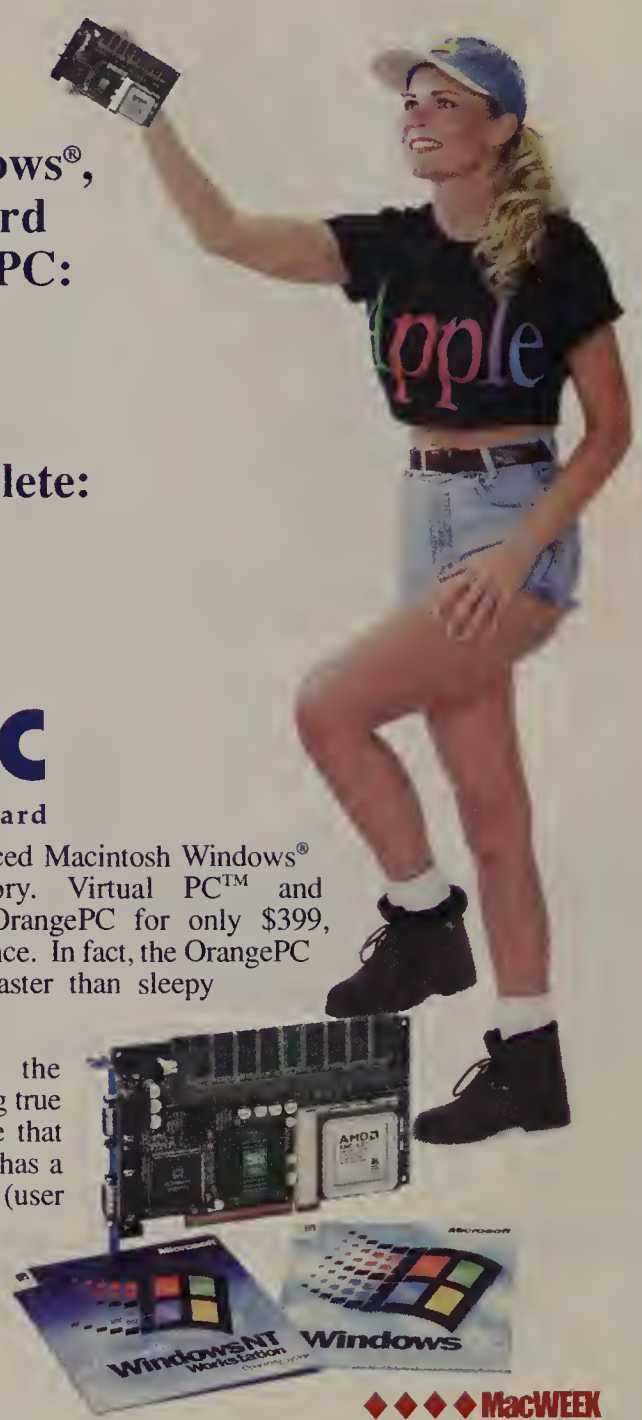

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Letters

Unpleasant Surprise in QuickTime 3.0

As a multimedia developer, I love the adaptability and portability of Apple's QuickTime technology, and am amazed at the great features in QuickTime 3.0 Pro. But after downloading a QuickTime movie from the Web with the new QuickTime plug-in, I was shocked. Unless I pay $30 and upgrade to the Pro version, I no longer have the option to "Save as QuickTime Movie"—which was a standard feature of the previous QuickTime plug-ins.

I am now expected to pay for something that I got free in the older versions of the plug-in? This sounds more like a Microsoft tactic than something my favorite tech company would do.

While $30 is not an unreasonable sum of money to pay for QuickTime 3.0 Pro's great features, taking previous features away from us and making us pay to get them back is not acceptable.

Chad Kerychuk
Edmonton, Alberta, Canada

As consolation, check out this month's Quick Tips *to learn how to get many of QuickTime 3.0's advanced functions in MoviePlayer without spending a dime.—Ed.*

David versus Goliath's Market Share

Stephen Beale asserts in "Pretenders to the Throne" that market dominance of a software package should be the presiding reason for choosing that software (*News*, May 1998). If his reasoning were correct, I'm afraid that the Mac OS would now be extinct.

The article is blatantly unfair to SoftLogik's PageStream, as well as to the other "pretenders" to the QuarkXPress

throne. After giving minimal lip service to these programs in the beginning of the article, he extols the virtues of QuarkXPress—the biggest of which seems to be its standardized use by service bureaus.

I've used both XPress and PageStream; PageStream's superb interface and ease of use beat QuarkXPress hands down. I hope this slight to an excellent program is rectified and that a full review of PageStream is forthcoming in the near future.

Charles Cavanaugh
Westford, Vermont

We reviewed PageStream in our June 1998 issue, and through extensive testing found numerous flaws that make the software unsuitable for professional publishing.

Also, a major point of the news article is that with page-layout software, market share is more critical than with other kinds of software because it determines the likelihood that your service bureau will be familiar with the program and its common output problems. —Stephen Beale

Web Tool-Kit Extras

An important and widely available Web publishing application was not covered in "The Web Publisher's Essential Tool Kit" (May 1998): Netscape Communicator's Composer, an often-overlooked component of Netscape Communicator version 4 and later.

Composer is comparable to Symantec's Visual Page in terms of page creation and editing. I created my first Web page using Composer, and found it to be quite easy and intuitive. It lacks some of the advanced features found in Visual Page (it has no forms or frames), but it does allow visual editing, FTP, and HTML editing, and it has a spelling checker. For quick page layout, it's very good—and best of all, if you already have Communicator, it's free.

Gary Jensen
Alameda, California

I enjoyed "The Web Publisher's Essential Tool Kit" but was disappointed to see no mention at all of CGI scripting languages. Both Perl and Python are available for the Macintosh as freely redistributable software. Either language can be used to perform CGI-based form processing, database and network access, system-administration tasks, and other useful functions.

I recognize the value of the GUI-based approach, but there are some tasks that cry out for text-based tools such as Perl. One instance might be the need to do content-based editing or copy a large number of files. The Finder is not well suited to long sequences of repetitive actions; the ability to automate tasks with scripts can save effort and reduce error.

MacPerl (Perl 5 for the Macintosh)

continues

JEFF NEUMANN

CORRECTIONS

- *In our review of MYOB Accounting Plus 7.5 (June 1998) we incorrectly noted the demise of competing products Big Business and Peachtree Accounting. In fact, both products are alive and well. Business Inc. sells Big Business for $395; Peachtree Accounting is now Aatrix Accounting, and sells its product for $128.*
- *The price for Alsoft's PlusMaker utility in "The HFS+ Survival Guide"* (Secrets, *April 1998) is $29.95.*
- *The illustration "Prevent Collisions" ("10 Menacing Font Foibles,"* Create, *May 1998) is labeled incorrectly: "With Ligatures" and "Without Ligatures" should be reversed.*
- *You can install up to 192MB of SDRAM in the PowerBook G3 ("Desktop Invaders," June 1998).*
- *Arnold Tiosejo took the July 1998 cover photograph.*

has a very active user community; for more information, visit MacPerl Pages (www.ptf.com/macperl/).

RICH MORIN
Pacifica, California

JASON SNELL DID A GREAT JOB IN the "9 Great Web Authoring Utilities" sidebar ("The Web Publisher's Essential Tool Kit"), telling us about all the neat tools out there, but he didn't mention what I consider a very important feature of Yves Piguet's GifBuilder: it imports QuickTime movies to create animated GIFs. If you have a camcorder and a Mac with NTSC video-in, you can really whip out some cool GIFs, and GifBuilder's frame editor makes it easy to cut down the number of frames. It's a great way to get video of the kids to the grandparents.

DAN BULLARD
Portland, Oregon

20th-Anniversary Romance

ALLYSON BATES'S BLURB ON THE Twentieth Anniversary Mac is outdated and misses the point (*News*, May 1998). First, she says the Anniversary Mac's price is $3,999, although its price dropped to $1,999 a few months ago.

Second, with regard to her statement on the relative value it offers—granted, the 250MHz 603e processor is not nearly as fast as a G3. But this Mac is not about raw speed. To see one, to hear one, and to use one is to love one. It's undoubtedly the most elegant and stylish computer ever made. And let's not forget the Bose audio system, TV/video input, remote control for the vertically mounted CD player, and three-year warranty. I believe that most people who were lucky enough to buy one of these masterpieces for $1,999 feel like they successfully robbed a bank.

Lastly, if it's good enough for Batman, it's good enough for me.

GENE AUSTIN
Bronx, New York

Prices sometimes drop after we go to press, which was the case with the Twentieth Anniversary Mac. So, if your main concern isn't speed, by all means go for it.—Ed.

Maintaining Balance

IN "THE BLACK ART OF BLUE-screening," what Jim Heid describes as "manual white balance" is in fact automatic white balance (*Create*, May 1998). Manual white balance is a feature only found in industrial and broadcast cameras, either with a CCU, or by removing access plates and using maintenance controls. And what Heid describes as "automatic white balance" is in fact not white balance at all, but merely a continuously updated rough estimate of proper white balance. Also, with regard to high-end formats, ¾-inch SP is also satisfactory (though not as good as Betacam SP), but Mr. Heid is ambiguous on the subject of Betacam SP: those not familiar with broadcast-video formats might assume he is referring to the old Betamax format.

J. LAMPERT
via Macworld Online

Well, you say "tomayto" and I say "tomahto." The manuals for many consumer-oriented cameras, even high-end ones such as Sony's VX-1000, refer to the technique I described as manual white balance. My usage was consistent with this. As for my discussions of formats, I think Macworld readers are savvy enough to know that my recommending "Beta SP" doesn't mean they should search out an old Betamax camera.—Jim Heid

More about MovieWorks

WE HAVE SEVERAL COMMENTS regarding the MovieWorks Interactive 4.0 review that appeared in the February 1998 issue. First, I understand that MovieWorks was tested on a Macintosh 7200/90 with virtual memory turned on. This information was omitted from the review, and it is important to point out that the performance of all QuickTime-based products will be adversely affected with virtual memory on. Second, MovieWorks was reviewed only as a presentation program. It is true that MovieWorks may be used to create interactive multimedia presentations, but its greatest strength lies in its ability to easily create QuickTime movies, including text, pictures, graphics, music, narration, video, animation, and 3-D objects. These movies may be played on both Macs and PCs, uploaded to a Web site, attached to an e-mail message, imported into other applications, or exported to video.

BILL LACOMMARE
President, Interactive Solutions
Pleasanton, California

Aliens from the Planet Quark

THE QUARK ALIEN MENTIONED IN David Pogue's 1998 Eggy Awards (*The Desktop Critic*, May 1998) appeared unexpectedly this week on one of the Macs at our newspaper, naturally at 5 a.m. after an all-night deadline struggle. It thoroughly freaked out the poor user who inadvertently hit ⌘-option-shift-delete.

I explained this Easter egg the next day, and to my surprise, the fifth time I demonstrated the alien, another sequence was triggered, involving a different large green alien monster. This special sequence apparently runs only every fifth time in version 4.0 of XPress.

WAYNE DAVIS
Winterset, Iowa

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The Vision Thing

by Andrew Gore

Miracle Happens Here

WITH MAC OS X, APPLE'S FUTURE IS NO LONGER CLOUDED IN DOUBT

LOOKING BACK OVER the last couple of months, it's easy to become giddy with excitement over how fast things have gotten better for the Mac. But no single event holds more portent for the future of the Mac, and therefore deserves closer examination, than Apple's recent announcement of Mac OS X (see "The X Factor," elsewhere in this issue).

Everything that Apple has done lately has been primarily focused on the company's short-term success—a return to profitability, the new PowerBook G3, Mac OS 8.5, even the highly touted iMac. Those are all tactical achievements that will start to build a healthy foundation for the future, but they should not be confused with the future itself. In 18 months, when Apple expects to ship Mac OS X to end users, all these products and events will be fading in the rear-view mirror.

Products like the PowerBook G3's and the iMac will do the job of revitalizing Apple's installed-base sales and regaining customers who have not bought a Mac in years. Getting fence-sitters to replace their old Macs could drive Macintosh market share up to 6 or 7 percent in the next year.

But here's the important point: that's as far as it will go. To get back up into double digits, Apple must find a way to lure a large number of new users to the Macintosh. Mac OS X is the only strategy Apple has articulated to date that speaks to the Macintosh's growth beyond the installed base.

Devil in the Details

If you were to take any one of Apple's previous strategies to build a modern OS—Copland, Gershwin, even Rhapsody—and lay out its development plan as a schematic, somewhere in the middle of the precise lines and glyphs you'd see a large cloud containing the words *Miracle Happens Here.*

Copland attempted to serve too many masters and managed to fail them all; Gershwin was a mirage on the horizon, never more than a code name; Rhapsody, while far closer to reality than its predecessors, made the mistake of forcing developers to rewrite their apps.

With Mac OS X, Apple at last seems to have figured out how to get to a modern OS without leaving the Macintosh behind. It delivers a truly modern OS: the Mach kernel on which Mac OS X is based is a time-tested foundation. Thanks to Carbon, the modernized version of the Mac Toolbox, current Mac applications can be made to run and take advantage of Mac OS X features with minimal effort.

JOHN RITTER

Perhaps more important, Mac OS X will still seamlessly run Mac apps that haven't been Carbonized—they won't be slowed down by emulation or quarantined in a separate window. These are both points lost on Rhapsody.

While this is all well and good, knowing where Shangri-la is and hiking to it through the most inhospitable terrain in the world are two entirely different things. Apple is the company that cried modern OS; we've all been here before so many times it's easy to lose count. Considering Apple's track record, guarded optimism seems to be what's called for.

Missionary Mac

Assuming that when we arrive, Mac OS X is all we've been promised, *then* what?

Mac OS X looks to be a robust, stable, and fast operating system that will really show off the capabilities of the G3, and by then G4, processor. However, Windows NT is already a fast and (relatively) stable OS. So how will Mac OS X attract new users?

The answer is ease of use. With the technological playing field between Windows and the Mac leveled again, it'll be back to the old game of ease-of-use one-upmanship, a game Apple is simply better at than Microsoft.

And the OS that Microsoft will be pitting against Mac OS X won't be Windows 95 or 98—it'll be Windows NT. And while NT is a powerful operating system, *ease of use* is not a term one could easily apply to it.

Of course, Microsoft will try to mash NT into something consumers will be able to hold their noses and use. And given the company's track record, at this it will no doubt succeed. Which means that for Mac OS X to win in this battle of the modern operating systems for the rest of us, Apple will need to make good on all its promises and aggressively and insightfully market its products.

A year ago, being left hoping that Apple could outmarket Microsoft would have put me in a suicidal depression. Today, based on the considerable track record that Steve Jobs' spin doctors have compiled, I think there's real hope that Apple can hold its own in the coming battle. m

Staunch users of Copland, Gershwin, Rhapsody, and Pink can share their past-life OS experiences at visionthing@macworld.com.

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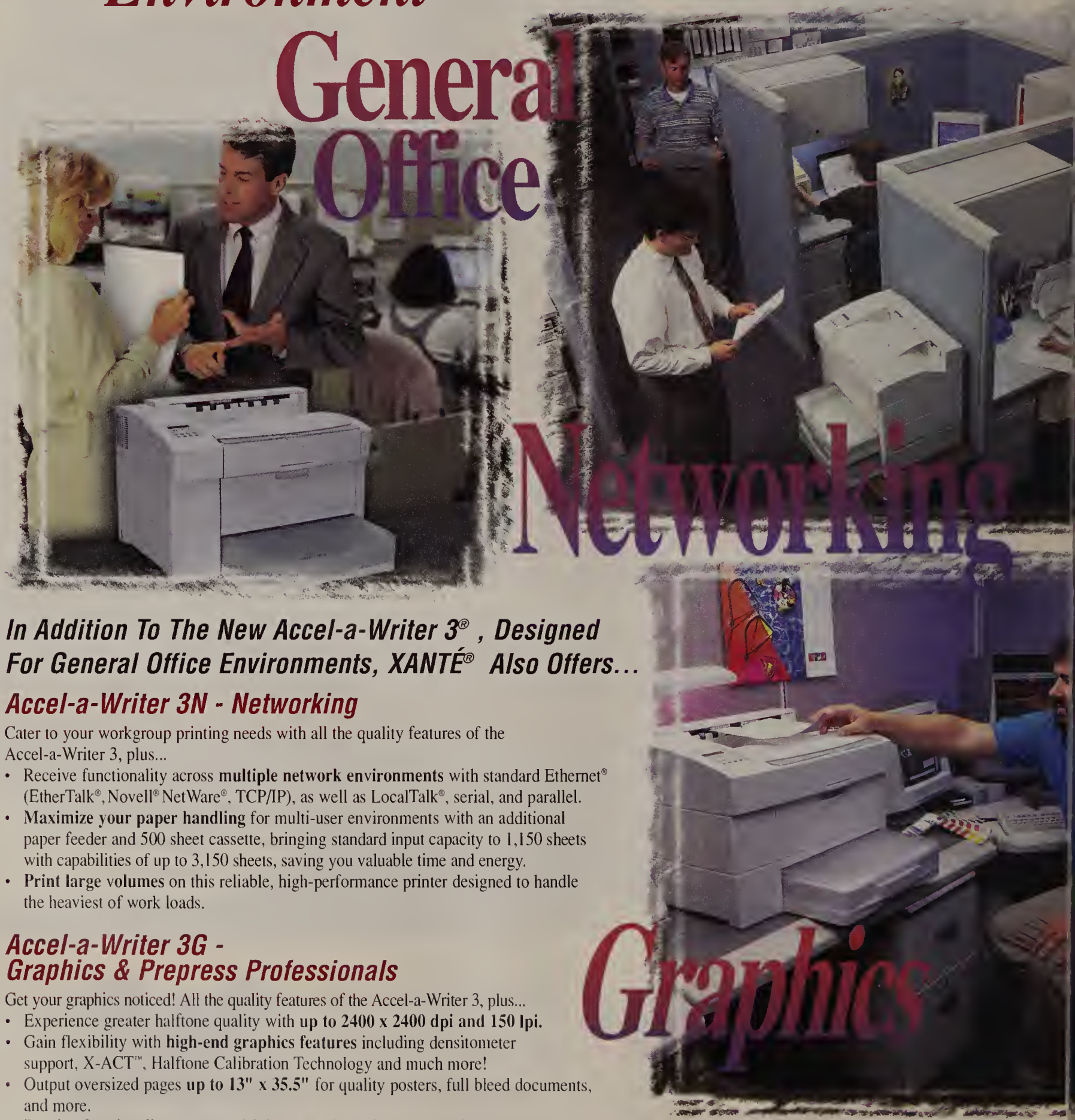

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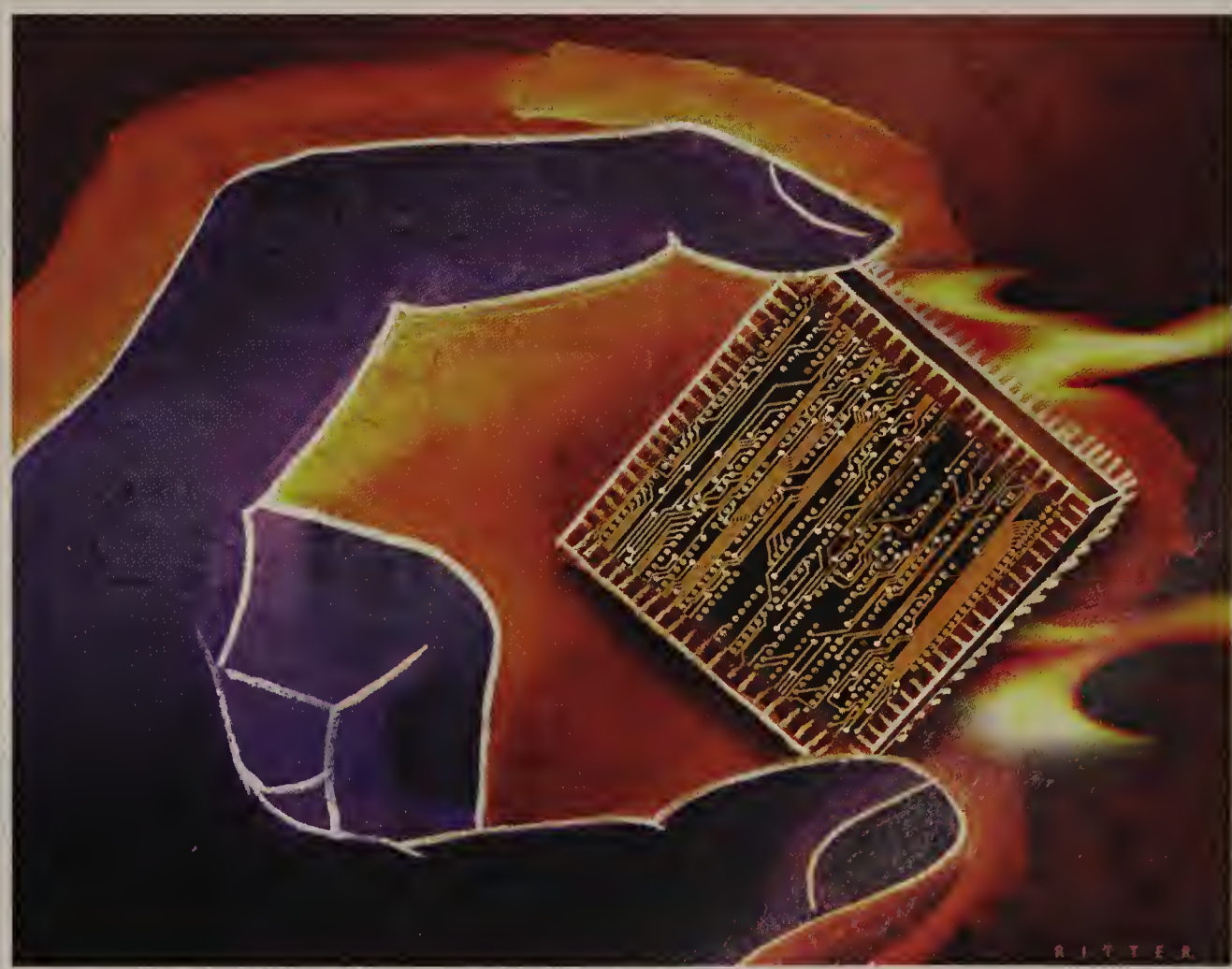
News

systems

Motorola CPU to Boost Multimedia Performance

ALTIVEC EXTENSION GIVES SUBSTANTIAL SPEED INCREASE

by Henry Bortman



JOHN RITTER

Responding to Intel's MMX technology, Motorola has announced an ultrafast PowerPC extension that is expected to speed up a wide range of tasks, from such basic functions as screen redraws to more specialized operations such as MPEG-2 decoding, Adobe Photoshop filters, color-space transformations, digital-audio– and -video–signal processing, and 3-D rendering. PowerPC CPUs with the new AltiVec technology could outperform Pentium II processors with MMX by as much as 30:1 on some operations, Apple and Motorola say. (The companies based these numbers on a computer simulation of the chip's design, not on actual samples.)

Developed jointly by Motorola, IBM, and Apple, AltiVec will be incorporated into Motorola's forthcoming G4 PowerPC processors. Motorola expects to make available the first G4 samples later this year; Apple expects to begin shipping G4-based systems in the first half of 1999. IBM, which is focusing on developing high-speed copper-wired PowerPC CPUs, has no current plans to implement AltiVec technology.

Demand for Speed Much of the gain in processor performance over the last few years has come from higher clock speeds and improved caching methods. But even these advances have barely kept up with the increased demands of media professionals. For today's professional user, performing RGB-to-CMYK conversions or filter operations on multimegabyte files is a commonplace activity. And those who work in multimedia—encoding, manipulating, transmitting, and decoding digital audio and video; or rendering 3-D animations—often process data by the gigabyte.

In addition to the integer and floating-point units in today's G3 CPUs, G4 processors with AltiVec will include a 128-bit *vector-execution unit* —capable of both integer and floating-point operations—that can process up to 16 data elements at a time. In geek-speak, this is known as SIMD (single instruction, multiple data) parallel processing. G3

continues

processors can handle only one data element at a time.

AltiVec versus MMX MMX also uses the SIMD approach. However, Motorola claims—big surprise—that AltiVec has a distinct edge. AltiVec can handle 128 bits of data at a time, compared with MMX's 64 bits. Furthermore, AltiVec provides 32 data registers (holding areas), compared with MMX's 8 registers. Thus, AltiVec can process eight times as much data per instruction as MMX. In addition, AltiVec's registers are dedicated, whereas in a Pentium II processor, MMX operations and floating-point operations share the same set of registers. This causes performance to lag as the Windows program switches from floating-point to MMX instructions and vice versa.

AltiVec is also designed to perform a wider range of operations than MMX. For example, AltiVec implements a *permute* function (a reordering of the data held in a register); MMX doesn't. So what? This is exactly what must be done to every block of MPEG-2 data read off a DVD, to cite just one example.

Gotchas So how much

continues on page 26

systems

Mac Java Gets Boost from Symantec Deal

NEW VIRTUAL MACHINE DUE THIS SUMMER

by Stephen Beale

Sun Microsystems' Java language is supposed to be the technology that levels all computer platforms and renders OS distinctions meaningless. But for Mac loyalists, Java has fallen far short of its promise. Java applets that blaze on a PC slow to a crawl on the Mac—if they run at all. And Mac users must contend with up to three Java virtual machines—the software that lets your Mac run Java—each of which handles the language a little differently.

A New Brew This is all about to change, thanks to recent announcements from Apple and others. In March, Apple and Microsoft said that they would merge their Java virtual machines into a single Mac OS Runtime for Java (MRJ). A month later, Apple announced that it would develop a plug-in that allows Netscape Navigator to run Java applets through MRJ; Navigator currently uses its own built-in Java interpreter.

As a result, Navigator and Microsoft Internet Explorer will use the same underlying software to run Java applets, whether the applets are written using Sun's 100% Pure Java or Microsoft's Java extensions.

Fast MRJ The other piece of the puzzle fell into place at Apple's Worldwide Developers Conference in May, when the company announced that it had licensed Symantec's

just-in-time Java compiler for integration into MRJ.

Apple says that early test versions of MRJ with the Symantec software showed a 300 percent speed boost. PCs can still run applets a bit faster, but Apple hopes to close the gap when MRJ ships this summer.

Power Struggle Ironically, Apple is making these strides at a time when a power struggle among developers is threatening Java's promise as a platform-agnostic software environment.

Sun and Microsoft are engaged in a nasty legal battle over the latter's modifications to the language; a judge recently ruled that Microsoft cannot use the Java name with its implementation of Java.

Hewlett-Packard, citing Sun's licensing terms, has developed its own version of the Java language for use with handheld computers; HP promptly licensed its Java clone to Microsoft.

Meanwhile, Sun is catching heat for the slow pace of Java improvements—and for the company's approach to establishing the language as an industry standard. Sun has submitted Java for consideration by the ISO, but wants to control Java development itself rather than giving that responsibility to an independent body, as is usually the case with official industry standards.

Apple's Hardware Future

AS MOTOROLA PROMISES FASTER PowerPC performance, Apple plans to turbocharge other Mac system components. During a session at Apple's Worldwide Developers Conference in May, company officials discussed the Mac architecture of the future, which they said will be simpler yet much faster than what's currently available.

A hint of that future lies in Apple's recently introduced iMac. Like the new consumer model, tomorrow's Macintoshes will include 100BaseT Ethernet and Infrared Data Association (IrDA) ports as standard equipment. Serial ports and the Apple Desktop Bus (ADB) will give way to the faster Universal Serial Bus. Floppy drives will disappear, although some models will feature high-capacity removable media.

Instead of SCSI, future Macs will use Ultra2 SCSI or Ultra ATA for connecting hard drives, and FireWire for connecting video cameras and other external peripherals. DVD-ROM and DVD-RAM will replace CD-ROM.

A new Comms Module slot will let you add modems, wireless Ethernet cards, Asynchronous Digital Subscriber Line (ADSL) modules, and other communications devices.

Memory bus speeds, Apple says, will move from the current 66MHz and 83MHz to 100MHz by the end of the year and higher by next May. PCI throughput, which has doubled over the last year to about 60 MBps, should reach 240 MBps next year, Apple says.

For users who require even more speed, the company says it may be able to offer multiprocessing systems by May 1999.—MACWORLD STAFF

BRYAN WIGGINS

printing

Apple Shifts Imaging Strategy

FEWER APPLE PRODUCTS, MORE VENDOR SUPPORT

by Stephen Beale

During the past several months, Apple has quietly transformed what was once its most profitable business: selling imaging peripherals such as printers and digital cameras. No longer will Apple offer a complete line of company-branded peripherals. Instead, Apple says it will help other companies develop mass-market peripherals for the Mac while reserving its brand for higher-end products, such as the LaserWriter 8500 laser printer and the Apple Studio Display, Apple's first LCD monitor (see *Reviews*, in this issue).

HP Deal The most dramatic sign of this new strategy came in April, when Apple announced a deal with Hewlett-Packard to help the latter develop ink-jet printers for the Mac. HP manufactured the Apple-branded Color StyleWriter 4500 and 6500, which first appeared about a year ago. Under the new deal, Apple's former supplier will sell printers under the HP brand.

Once Apple sells its inventory of Color StyleWriters, the company will leave it to HP, Epson, and others to sell ink-jet printers for the Mac. HP already offers two ink-jet Mac printers, the DeskWriter 694C and DeskJet 890CM, but only to the education market.

Helping HP in its Mac efforts is Infowave Wireless Messaging, which offers software for connecting Macs to PC printers. Apple has given Infowave access to the software that drives the StyleWriter; Infowave will use the code to develop Mac drivers for HP's output devices, and will also be able to assist other manufacturers who want to offer printers for the Mac.

Printers Wanted There is little doubt that such assistance is needed. With Apple's well-publicized difficulties, printer manufacturers have been reluctant to spend resources on the Mac. For example, the latest ink-jet printers from Canon—once Apple's main supplier for printer engines—don't work with the Mac. As Apple's fortunes improve, this situation is likely to change, but for now your ink-jet choices are limited to older models from Apple or the latest Stylus printers from Epson.

3-D Printer Turns Models into Objects

PRINTING IMAGES FROM Adobe Illustrator or Macromedia FreeHand is easy. But how do you "print" models from a 3-D CAD program? Try the Z402 Three Dimensional Printer from Z Corporation (617/628-2781, www.zcorp.com), a rapid prototyping system that produces physical objects from 3-D models created on a computer. The printer builds the objects by spreading layers of cellulose powder that are bound with an adhesive resin. The objects, which can measure up to 10 by 8 by 8 inches, can be sanded, painted, or drilled.

Rapid prototyping is nothing new, but the Z402 is much faster than other 3-D production systems and sells for a relatively modest $59,000. It runs on Windows workstations and uses the STL CAD format. STL is not well supported on the Mac, but many CAD service bureaus have software that can convert files from the popular IGES format to STL. Z operates its own rapid prototyping service bureau and says it can accept Mac files.

Add a 3-D scanner to the system and you get the 1990s equivalent of the replicators on the *Starship Enterprise:* scanned objects—even someone's head—can be quickly turned into a 3-D prototype.—STEPHEN BEALE

KEVIN CANDLAND

This piece was created on Z's 3-D printer.

entertainment

Mac Games Gain Steam at E3 Show

VENDORS RETURN TO MAC WITH NEW TITLES

by Andrew Gore

A game developer at the recent Electronic Entertainment Expo (E3) in Atlanta said it best: "The Mac's the best game platform around; too bad there aren't any Mac games."

Mac users like to play games, but Apple's limited efforts to encourage game development—and the company's financial problems—have kept vendors away. However, with the new iMac, a brightening fiscal outlook, and a concerted effort to evangelize game developers, Apple is beginning to win them back.

Games Aplenty For those with access to the backrooms of E3, evidence of this change was everywhere.

Sources told *Macworld* that Aspyre Media, an Austin, Texas, company, plans to release a Mac version of the popular Tomb Raider II this holiday season. The company also plans to release the original Tomb Raider sometime after that.

MacSoft, the company that last year led the vanguard of game vendors recommitting to the Macintosh has projected an even more ambitious wave of new titles for 1998. Capitalizing on the runaway success of its Civilization II for the Mac, MacSoft announced that it will ship Civilization Gold Edition in July. The Gold Edition combines Civilization II with Civilization Multiplayer, which allows simultaneous play over a network.

For those who would like nothing better than to pop Bambi right between the eyes, MacSoft also announced that it will ship Deer Hunter for the Macintosh by Macworld Expo in July. Deer Hunter was the surprise hit of the last quarter in the PC market, selling more than a million copies.

Also expected from MacSoft in winter 1998 will be Total Annihilation, a Command & Conquer–type real-time strategy game, and Falcon 4 of the Fighting Falcon

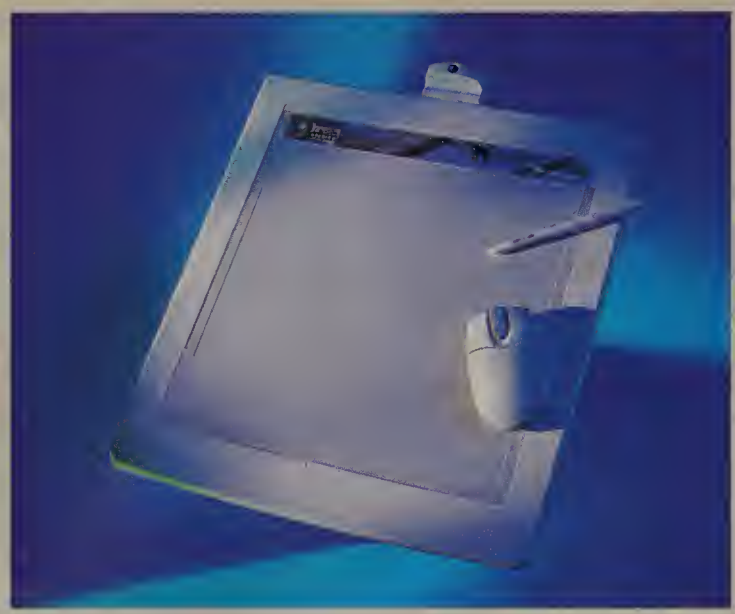
continues

flight-simulator fame.

The long-anticipated Unreal, due in late July, is a first-person shooter in the Quake vein that promises breakthrough graphics. Rounding out MacSoft's bill is the recently shipped Real Pool, a photo-realistic billiards simulator.

Myth Sequel Bungie Software, which trounced Doom with the cult classic Marathon, gave E3 attendees a sneak peek at Myth II: Soulblighter, the sequel to the company's best-selling Myth fantasy combat game. Expected to ship this winter for both Mac and PC, Myth II features greater realism, new special effects, and new scenarios.

Blizzard Entertainment, after finally shipping the Mac version of Diablo (which, by all indications, will be one of the hottest Mac games of the year), is now readying StarCraft. The long-awaited sci-fi takeoff on the best-selling WarCraft series should ship later this summer.



KEVIN CANDLAND

Pen and Mouse Share New Tablet

EVEN CONFIRMED USERS OF GRAPHIC TABLETS OFTEN prefer a mouse over a stylus when working with word processors, databases, and spreadsheets. Calcomp's (714/821-2000, www.calcomp.com) new Creation Station and Creation Station Pro feature a pressure-sensitive stylus along with a cordless, battery-less, five-button mouse—the first one designed to work with a digital tablet. Both mouse and pen offer a QuickScroll feature, for easy scrolling from anywhere on the screen.

The 4-by-5-inch consumer-level Creation Station, bundled with Kai's PhotoSoap and Art Dabbler (both from MetaCreations), will sell for $99. The Pro version, bundled with Live Picture and MetaCreations' Painter 5, comes in three sizes: 6 by 9 inches ($298), 12 by 12 ($389), and 12 by 18 ($599). Both will ship in July.—CATHY ABES

multimedia

Apple Modifies QuickTime License Terms

QUICKTIME PRO DEMO INSTALLED JUST ONCE

by Stephen Beale

Apple Computer, responding to complaints from multimedia producers and software vendors, has modified the terms under which they can distribute QuickTime 3.0 (see "Apple Mines QuickTime in License Deal," *News*, July 1998).

Under the original licensing scheme, producers could choose between paying Apple $1 per QuickTime-enabled title or running a promotional movie that encourages users to upgrade to QuickTime Pro. If you deleted the movie, it would be installed again the next time you launched the multimedia title. Under the new terms, the movie is placed on your desktop only when you install the multimedia title; if you delete the movie, it won't be recopied to your Mac.

Windows Respite In another change of direction, Apple will allow developers to continue using QuickTime for Windows 3.1 in their Windows-based multimedia titles. Originally, Apple eliminated all licenses for previous versions of QuickTime, placing Windows developers in a bind because many had built their titles around the older software.

Going Live Apple has also announced that it will add live Internet broadcasting features to a QuickTime update scheduled for release this fall.

The software appears to be catching on, even in the PC world. On May 11, Apple announced that 1 million copies had been downloaded—two-thirds of them to Windows users. Market researcher Media Matrix estimates that QuickTime—including earlier versions—is installed on nearly 24 million Windows PCs.

"MOTOROLA CPU TO BOOST MULTIMEDIA PERFORMANCE"

continued from page 24

faster will your programs run with AltiVec processing onboard? The real question should be, When will your Macintosh programs run faster with AltiVec?

To take advantage of AltiVec, software will have to be modified. Apple says it will optimize portions of the core Mac OS, as well as QuickDraw and the QuickTime Media Layer, for AltiVec but has not indicated the OS version(s) in which these changes will first be incorporated. Likewise, software developers will have to rewrite their applications to capitalize on AltiVec. No delivery dates from them yet, either.

That's on the software side. On the hardware side, it's great to have a screaming-fast CPU, but if the rest of the system hardware can't feed the processor quickly enough, AltiVec's greatest accomplishment may be to shift the Mac's hardware bottleneck to the system bus or another component.

Apple has not said specifically how it will address these nagging details. However, at the recent Worldwide Developers Conference, Apple representatives said that future Mac systems will incorporate faster buses and other components (see "Apple's Hardware Future," in this section).

The designation G4 itself appears to suffer from a bit of quantum uncertainty. To Motorola, G4 is the processor described in this article, which includes AltiVec. However, to IBM, G4 is a 450MHz chip based on that company's copper-based chip-fabrication process—and does not include AltiVec.

"You just got a new Mac two years ago, you'll have to wait at least another year."

Sometimes Newer Is Smarter Than New.

It's hard keeping an office geared up with the latest technology. And, in a PC-friendly corporate world, it can be even harder trying to justify buying new Macs. So, when you finally get your Macs configured exactly right, the last thing you want to hear is that Apple is about to release even newer machines that are twice as fast.

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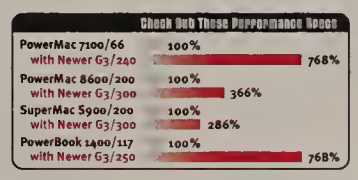

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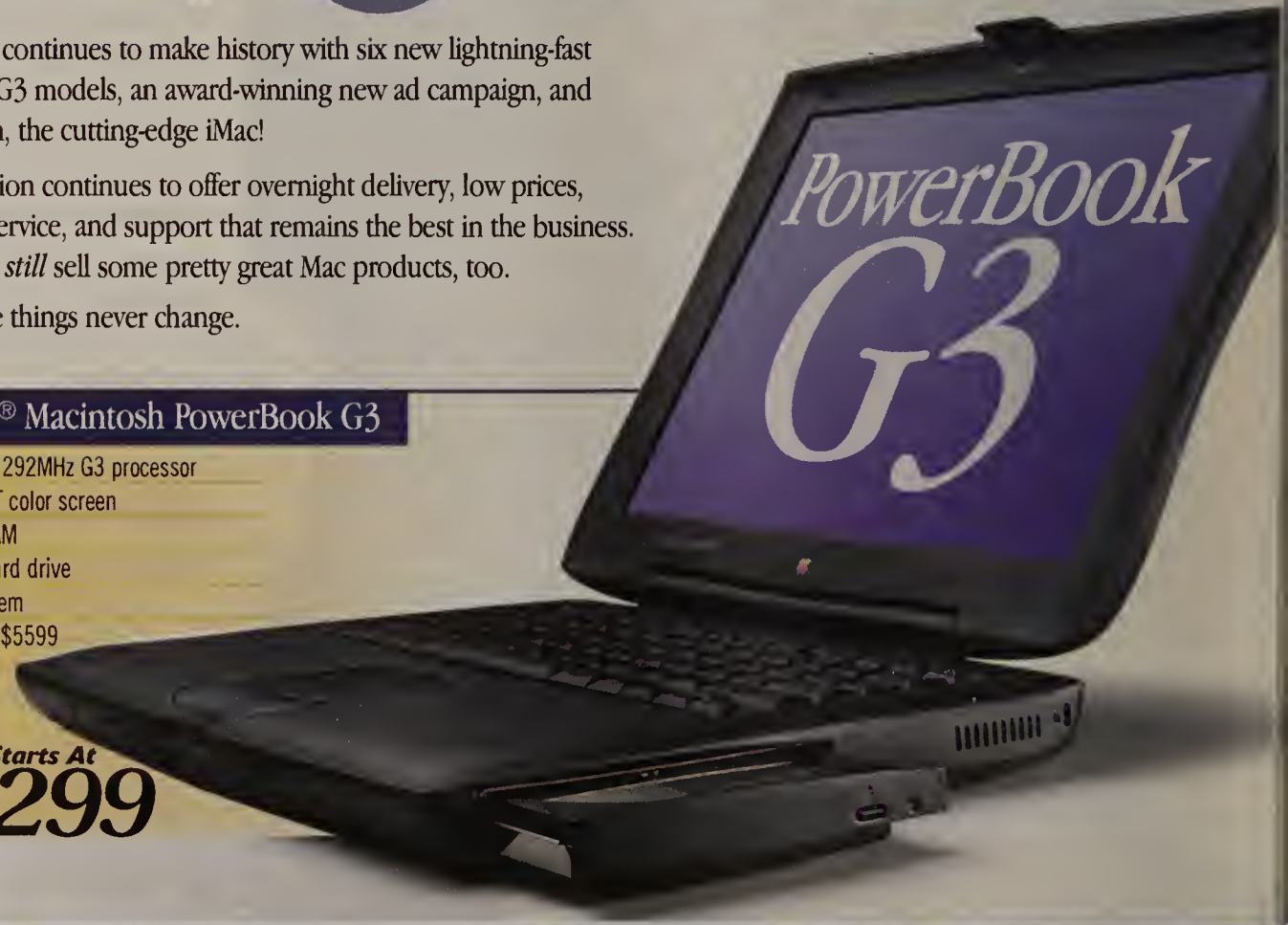

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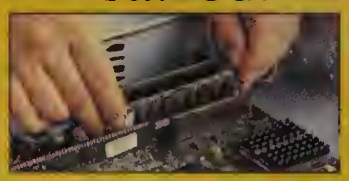

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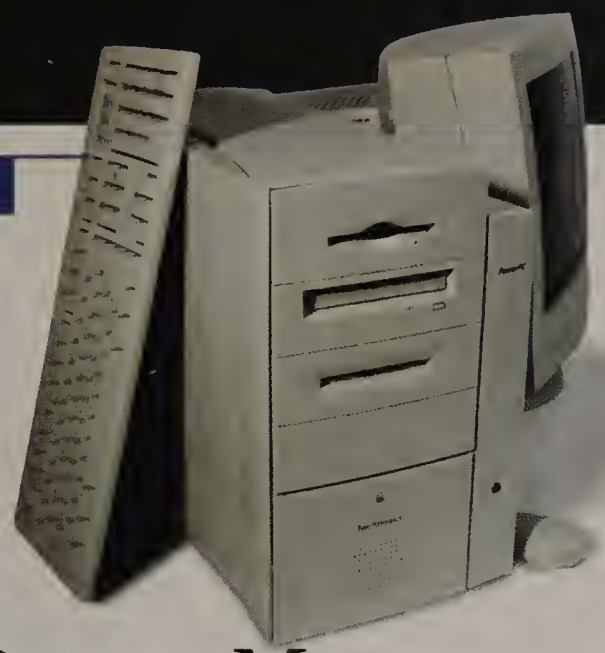

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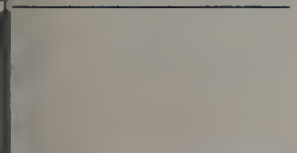

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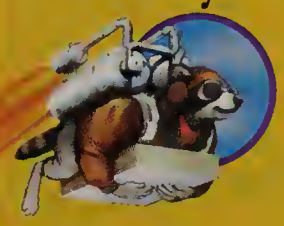

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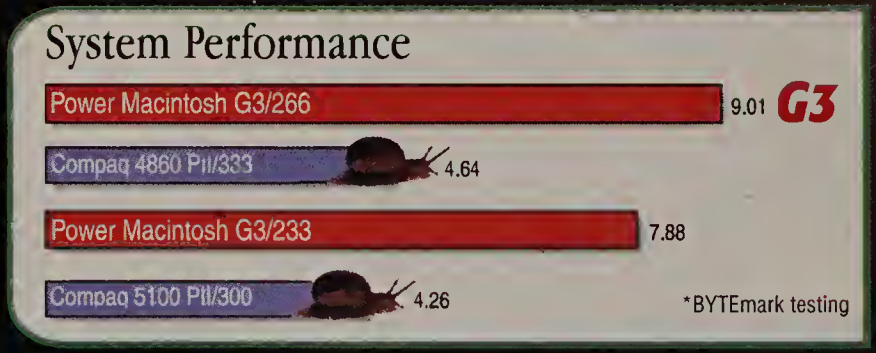

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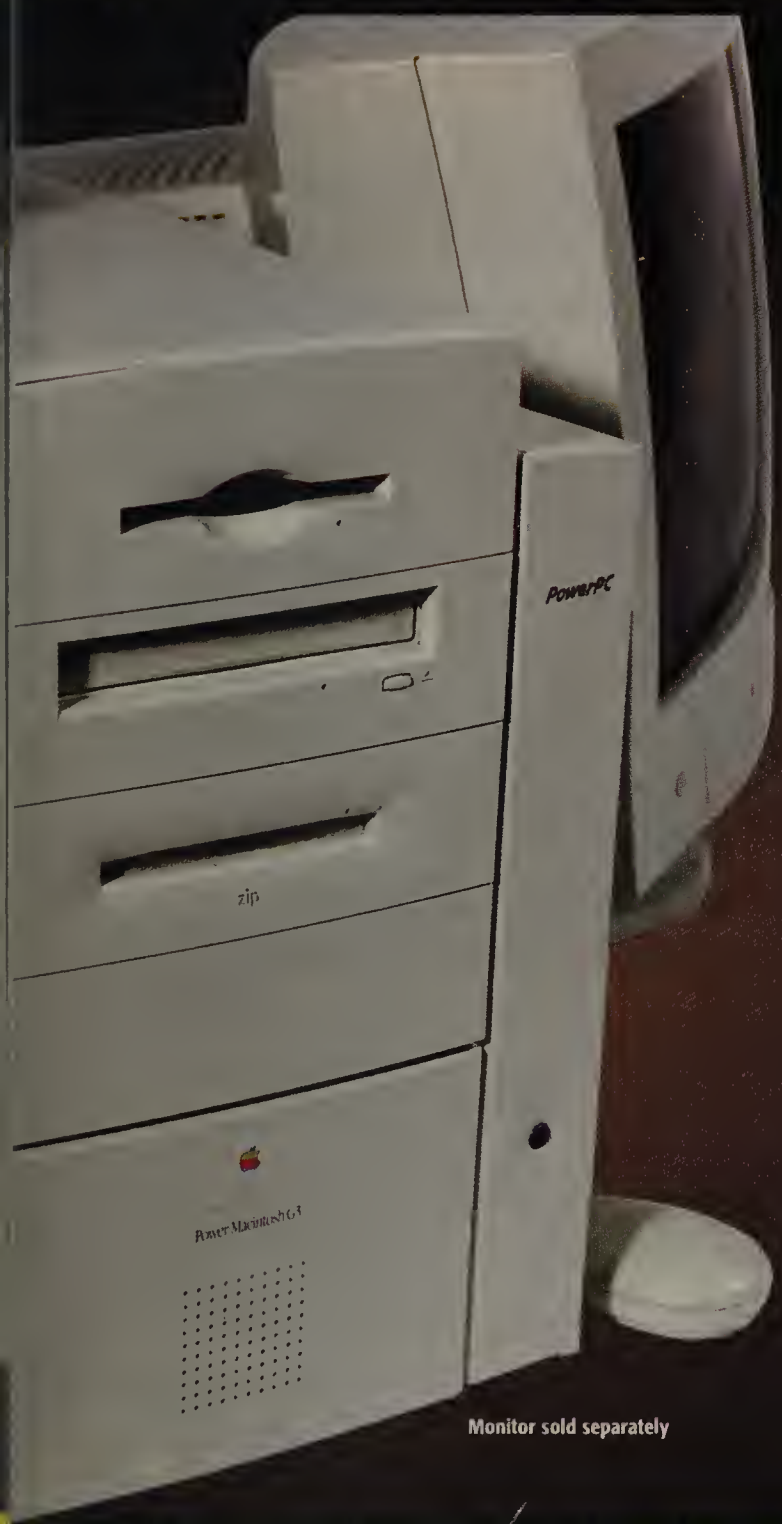

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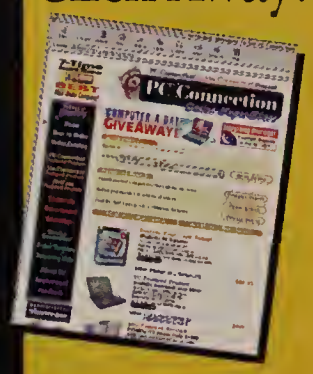

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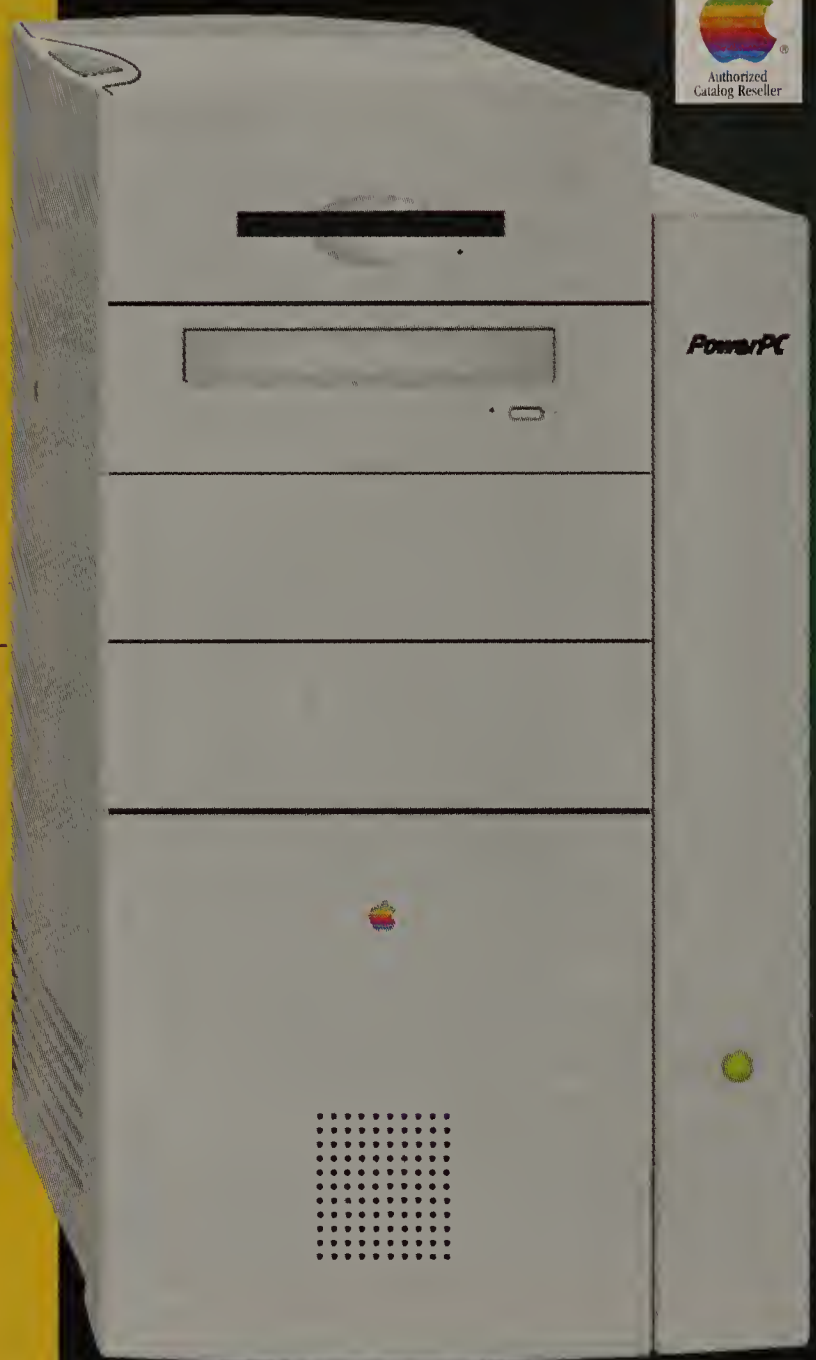

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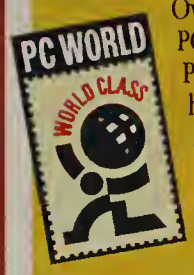

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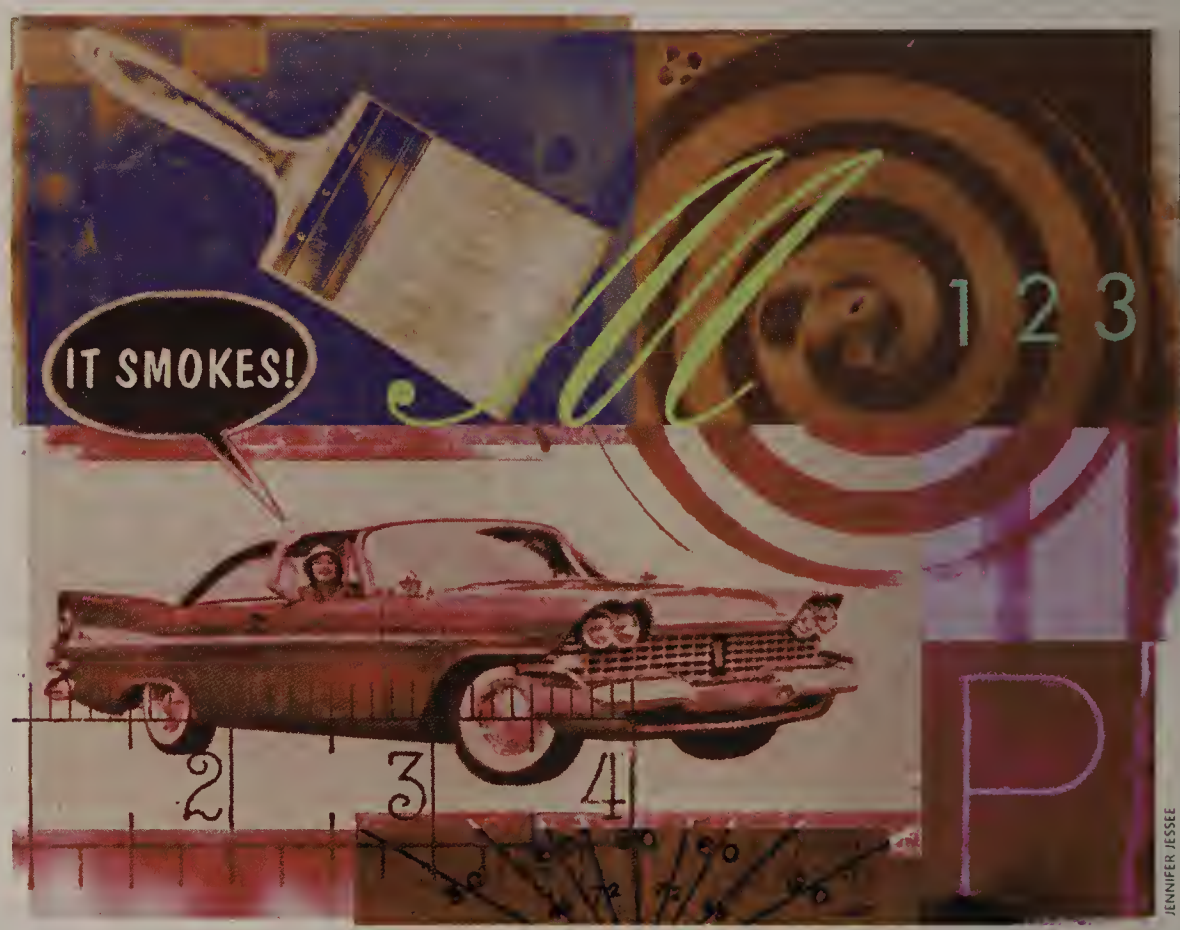
Reviews

Photoshop 5.0

KEY FEATURES MAKE THIS PHOTOSHOP UPGRADE THE STRONGEST EVER



JENNIFER JESSEE

ADOBE PHOTOSHOP'S DESIGN approach has always been, in a word, conservative. Popular though it is, Photoshop has never been the kind of program to lead the charge in a feature war; it was neither the first imaging application for the Mac nor the first image editor to implement virtual memory, pressure sensitivity, CMYK separations, masks, layers, macros, worry-free color corrections, or any of the other features for which it's praised. In fact, the only feature I recall seeing first in Photoshop was duotones. But when Adobe gets around to adding a feature to Photoshop, its implementation is usually logical, efficient, and stable.

Longtime Macintosh artists have seen most of version 5.0's new features in other programs. But simply saying these features are finally here doesn't do them justice. All the features are well executed, a few are implemented better than I've seen in any other program, and one or two will change the way you work. Photoshop 5 isn't just good, it's indispensable.

Beyond Multiple Undos

For years, Photoshop users have been clamoring for the ability to undo beyond the last operation. Photoshop 5 tracks as many as 99 operations (20 by default) in the new History palette. And while the program does an admirable job of minimizing the overhead needed to track each undo—by subdividing an image into tiles and buffering only modified portions—the History palette consumes RAM with an appetite matched only by layers: the program's minimum RAM requirement has doubled, from 16MB to 32MB. (Artists who grumble about Photoshop's RAM requirements can always lower the number of undos to one.)

On the other hand, assuming you have at least 64MB of RAM, the History palette delivers a degree of flexibility unmatched by any other graphics program for the Mac or PC. The palette records each operation as an independent *state*, which represents the state of the image at a specific point in time. You can backtrack one operation at a time, or revert directly to a state several operations old, merely by clicking on the name of the state in the palette. And the speed is amazing: in tests on a Umax S900Base equipped with a Maxpowr Pro+ G3 CPU board and 288MB of RAM, I reverted a sequence of 20 complex operations applied to a 50MB image

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in a fraction of a second. If you have enough RAM to hold the entire undo buffer, the History palette reacts as quickly as you offer instructions.

Because the History palette tracks the specified number of states separately for every open image, you can switch back and forth among images without losing the ability to undo. The undo buffer is extremely sensitive, tracking adjustments made to selection outlines and letting you undo operations even after you save or print an image. And the History palette doubles as an excellent production tool: with its history brush, you can paint back to any state.

Trusting in Consistent Color

Prior to version 5, Photoshop supported two device-independent color spaces—CMYK and Lab. You could expect a CMYK or Lab image to look roughly the same on any screen, but an RGB image could shift wildly depending on the limitations of each monitor and platform.

Photoshop 5 makes two important advances in color management. First, because the program fully complies with ColorSync 2.1 on the Mac and with ICM 2.0 under Windows 95 and NT, it can maintain consistent colors with programs that depend on ColorSync and ICM for their color-management functions (including Adobe Illustrator 7 on the Mac and CorelDraw 8 for Windows). For the first time, you can trade CMYK and RGB artwork between Photoshop and Illustrator without the colors shifting on screen.

Second, you can use one of Photoshop 5's predefined RGB settings, ranging from the Microsoft-blessed sRGB Windows standard to the high-definition–television standard SMPTE-240M, or you can define your own. Web designers can use the sRGB standard to predict how images will look on consumer PCs; prepress professionals can use SMPTE-240M to ensure more-accurate color calculations and maintain consistency with other Photoshop 5 users.

This feature's biggest drawback is that it isn't altogether backward-compatible with Photoshop 4—at least not by default. If Photoshop 5 encounters an RGB image created in a previous version of the program, it will convert the colors to its new default color space, sRGB. Although this is unlikely to damage most images, you'll almost certainly notice a shift in the appearance of your images.

Fortunately, Photoshop lets you disable the color conversions and select a more satisfactory color space, such as SMPTE-240M. You not only have full control over the way the feature works but can also even give colleagues your preference file to make sure the screen image they see matches the one you see.

Photoshop's default settings are sufficiently strange, and this feature sufficiently complex, that many experienced designers will raise their voices in protest. But for those who want consistent color and are willing to take the time to learn how to get it, Photoshop 5 offers better color-management capabilities than any other graphics program for the Mac.

More to Love

The History palette and color-settings commands alone justify my unqualified endorsement of Photoshop 5, but there's much more to this upgrade. For example, you can now edit type from one session to the next. The type remains bitmapped, and you still have to work inside a dialog box, but you can fix spelling errors and change formatting attributes in a flash. And you can finally apply multiple formatting attributes inside a single text block and manually kern characters.

If you like to create macros, the improved Actions palette can record virtually any operation, including the drawing of selection outlines; the only operation you can't record is a brush stroke. Other enhancements include the ability to add spot colors to CMYK images, automatic drop shadows and bevels, edge-detecting selection tools, and a tool for measuring and correcting crooked photographs, all of which are documented at length in last month's *Macworld* ("Photoshop Pumps Up," July 1998).

Photoshop 5 makes new demands in return for its considerable features. Adobe has not only raised the list price from $895 to $995 but is also charging $199 for upgrades before July 31 and $249 thereafter—an increase of $50 over previous upgrades. Furthermore, Photoshop 5 runs exclusively on Power Macs, which means it can't run on, say, an aging PowerBook 540c. However, neither the price nor the system requirement is out of line with that of other graphics applications—everything from MetaCreations' Painter to CorelDraw stopped supporting 680X0 machines years ago.

The Price of History Multiple undos in an image editor necessarily consume lots of RAM, but Photoshop manages the process as efficiently as you could hope for. I applied a series of operations to a 50MB image (A). Applying Levels (B) and Unsharp Mask (C) to the entire image adds another 50MB each to the buffer, because every pixel is affected, but pasting the moon (D) adds only 30MB—and that's mostly to accommodate the new layer.

Macworld's Buying Advice

The plain fact of the matter is this: Photoshop has long been the best image editor for the Macintosh, and version 5.0 is the best upgrade to Photoshop by a mile. At long last, it deserves *Macworld*'s highest rating.—DEKE McCLELLAND

RATING: ♦♦♦♦♦ **PROS:** Unsurpassed control over undo and redo; improved cross-application color management; editable text layer with manual pair kerning; support for spot-color plates. **CONS:** None significant. **COMPANY:** Adobe Systems (650/961-4400, www.adobe.com). **LIST PRICE:** $995.

Optical-Zoom Digital Cameras

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FOR DIGITAL PHOTOGRAPHY, there's nothing like an optical zoom for defining the composition of a photograph. It lets you not only close in on faraway subjects but also frame an image without having to stumble back and forth while peering through a viewfinder. Until recently, optical zooms have been rare; most so-called zoom cameras merely enlarge a cropped area of pixels to simulate a telephoto lens. Out of the nearly 30 cameras I've reviewed, only five came equipped with optical zoom lenses, and two of those zoomed to 200 percent or less.

But suddenly, three new offerings suggest that something of a trend is at work. Although the Agfa ePhoto 1280, the Fuji DX-9, and the Olympus D-500L are about as different as three digital cameras can be, they all let you magnify your subject by as much as 300 percent.

The Mechanics of Magnification

The D-500L, DX-9, and ePhoto 1280 are the first non-Kodak digital cameras under $1,000 to offer motorized zoom mechanisms. Instead of relying on a manual lever to slide the lens in and out—as the Minolta Dimage V (see *Reviews*, October 1997) and the Ricoh RDC-2 (see "Digital Cameras: Picture It Now," March 1997) do—these zoomers automatically glide their lenses at the push of a button, making it easier to zoom by small increments and get the framing just right. On the downside, this innovation means that the camera draws more energy, but in my experience none of the new batch of cameras went through its batteries any more quickly than the Minolta or Ricoh models.

My favorite zoom feature of the bunch is on the Olympus D-500L, which has the zoom lever mounted up front so that you can operate it easily with your index finger; pull the lever toward you to bring the image in, push it away to zoom out. And because the D-500L is a true SLR (single-lens reflex) device, you look through the very same zoom lens that the camera uses.

The zooms in the Agfa ePhoto 1280 and Fuji DX-9 rely on vertically mounted thumb buttons. The DX-9 setup is especially odd, requiring you to push up and down on a tiny, reluctant lever. Because of the angle of your thumb, you end up tilting the camera along with the lever, making it nearly impossible to keep the camera still when lining up a shot.

Flash and Focus

All three cameras offer built-in flash with red-eye compensation. Both the DX-9 and D-500L claim to automatically fill-flash foreground images in strong backlight situations, but in my testing the D-500L was the only camera to demonstrate this capability. The D-500L is also the only camera of the three with a raised flash that's aimed in alignment with the lens. The flash on the two other cameras is flush-mounted to the side of the lens, which often results in off-center lighting when shooting close-ups.

Most midrange digital cameras offer a fixed-focus lens, capturing, say, anything from a distance of two feet to infinity with the same degree of sharpness. But all three of these cameras provide a more desirable autofocus feature that lets you better convey depth in an image by shooting a crisp foreground against a soft background.

The DX-9 goes a step further by letting you adjust the focus manually, a first for a camera under $1,000. You have to turn on the LCD preview to gauge the focus properly, but this feature's quite handy when you can't get a good lock on your foreground subject. The ePhoto 1280 and D-500L each offer incremental manual-focus levels, but they fall short of Fuji's continuous manual focus.

Storage and Image Quality

One final similarity among the three cameras is that all are bereft of on-board memory and instead rely entirely on wafer-thin SmartMedia cards. The Fuji and Olympus models ship with a 2MB card; the Agfa unit includes a 4MB card. If you already own a SmartMedia card or two and you want to be able to swap them out in the field, the Fuji is the most versatile, accepting both 5-volt and 3.3-volt cards. The Agfa and Olympus models

Digital Cameras Zoom In to Action

Company	Agfa	Fuji	Olympus
Product	ePhoto 1280	DX-9	D-500L
Mouse rating	♦♦½	♦♦♦½	♦♦♦♦
Estimated street price	$899	$599	$899
Phone number	978/658-5600	914/789-8100	516/844-5000
Web address	www.agfahome.com	www.fujifilm.com	www.olympus.com
Dimensions (W × H × D, in inches)	6.1 × 2.0 × 3.8	5.2 × 2.7 × 2.0	4.5 × 3.3 × 5.1
Weight (with batteries, in ounces)	17	12	21
Maximum resolution (in pixels)	1,280 × 960	640 × 480	1,024 × 768
Default memory	4MB	2MB	2MB
Expandable media format	SmartMedia 3.3V	SmartMedia 3.3V or 5V	SmartMedia 3.3V
Storage capacity (in images) at maximum resolution	6	22–30	3–10
Focus mechanism	auto	auto or manual	auto
Closest focal distance (in inches)	4	8	12
Built-in flash/red-eye setting	yes/yes	yes/yes	yes/yes
LCD preview/playback	yes/yes	yes/yes	no/yes
Optical viewfinder	none	rangefinder	SLR
Photoshop acquire module	yes	yes	yes
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Macintosh connectivity	yes	yes	yes

accept the newer low-power 3.3-volt cards only.

But although the cameras' storage medium is fundamentally the same, the images stored on that medium are quite different. The Fuji DX-9 sports a ¼-inch CCD and captures 640-by-480-pixel images. The ½-inch CCD built into the Olympus D-500L captures 850,000 pixels and masks them down to 1,024 by 768. Both cameras provide two levels of compression at the maximum image size.

The Agfa ePhoto provides a maximum resolution of 1,280 by 960 pixels—four times that of an image from the DX-9—but its CCD actually captures slightly fewer pixels than that of the D-500L. Agfa achieves its higher resolution using an ingenious interpolation scheme dubbed PhotoGenie. When you shoot a photo at maximum resolution, the camera saves 1,024 by 768 pixels with no compression. During download, the software automatically runs the PhotoGenie routine, which intelligently adds pixels while maintaining the integrity and sharpness of edge details.

Take Me In To snap this interesting rock formation with the Agfa ePhoto 1280 (A), Olympus D-500L (B), and Fuji DX-9 (C), I needed a telephoto lens. Using a camera that lacks a telephoto option, such as the Olympus D-320L (D), I was too far away to get a decent shot without trespassing onto private property.

In every test I conducted, PhotoGenie provided much better interpolation than Adobe Photoshop. In fact, I can honestly say that I wouldn't have been able to tell—just by looking at them—that the images had been interpolated.

Software Broke the Camera's Back

The only problem with Agfa's software is getting it to work. When downloading to my PowerBook 540c, it took four to five hours to transfer a camera-full of images, and PhotoGenie turned all of my 1,280-by-960-pixel images blue. When I switched to my G3 desktop machine—a Umax SuperMac S900Base—I couldn't even get the software to run. The solution was to manually remove all the Microsoft OLE libraries from my Extensions folder so that the Agfa installer could reinstall them.

But the clincher came when I tried out the Photoshop plug-in module, which is incapable of running PhotoGenie and relies on Photoshop to resample high-resolution images—a fact that the documentation neglects to mention. More distressing, when importing an image shot at the standard 1,024-by-768-pixel resolution, the plug-in retains only the upper-left 640 by 480 pixels and crops away the other 479,232 pixels, again without warning. (Agfa claims that a fix for this final problem is in the works.)

The Olympus D-500L and Fuji DX-9 download utilities worked without incident. Like the Fuji-developed Apple QuickTake 200 (see *Reviews*, July 1997), the DX-9 includes Apple's Camera Access utility and QuickTime IC. Downloading images is as easy as opening an album from the camera and dragging and dropping the thumbnails into a folder.

Macworld's Buying Advice

Of the three cameras, Agfa's ePhoto 1280 took the best pictures with the most-accurate colors and the largest supply of pixels. The Olympus D-500L came in a close second, although its images were prone to oversaturation and excessive brightness (see "Take Me In"). Fuji's DX-9 ranked last in picture quality, producing soft shots with a stingy supply of pixels.

But if you're looking for a camera you'll have fun using, the DX-9 comes out on top. Like the QuickTake 200, the DX-9 operates extremely intuitively with well-designed controls—the zoom lever being the one exception—and a lithium-ion battery that charges inside the camera. The Olympus offers an SLR design and a first-rate zoom trigger, but it lacks a rechargeable battery or an AC adapter. The Agfa comes in a distant last due to both its flaky software and the fact that the camera takes 15 seconds to write an image to memory (compared with 4 to 6 seconds for the others). And although the DX-9 and D-500L come with small-format manuals that you can toss in your camera bag, the ePhoto 1280 comes with a hypertext PDF file only.

If a zoom lens is an important criterion, pick the camera that best balances performance and usability: the Olympus D-500L. Although its colors are a tad bright, its detail is smooth and even, with sharper focus than images shot with the closest equivalent zoom camera, Kodak's DC210 (see *Reviews*, April 1998). Better yet, the D-500L looks and works like a 35mm autofocus SLR. If you're looking for a familiar entrance into digital photography, the D-500L is your best shot.—DEKE McCLELLAND

RagTime 4.2

AMBITIOUS OFFICE SUITE DOES IT ALL . . . ALMOST

APPLE'S RECENT PROFITABILITY comes at the expense of some promising technologies; one of the most intriguing was OpenDoc, a now-abandoned format that allowed several applications to work with different kinds of data within a single document. Although OpenDoc is gone, its roots remain in RagTime 4.2, ComGrafix's integrated document-processing application.

Officier Suisse

RagTime's distributor describes the program as the "Swiss Army Knife of office applications" with good reason. RagTime incorporates features typically found in page-layout, word-processing, spreadsheet, and illustration applications. This idea may sound familiar to users of ClarisWorks (now known as AppleWorks) and Microsoft Office, but there's a difference: RagTime's integrated components share data without launching other applications or making you cut and paste elements between documents. Instead, you create *containers* on the page, using a technique familiar to QuarkXPress users—you draw a frame and then designate the kind of data it will hold, such as text, spreadsheets, pictures, drawings, graphs, movies, or sounds.

Clicking within a container changes RagTime's tool bar to reflect the kinds of operations you can perform; click within a text container, for instance, and RagTime's tool bar sports buttons for changing alignment and line spacing, a stylesheet pull-down menu, and tab controls. To work with grittier elements—such as kerning, word spacing, and drop caps—you press the tool bar's Information button to access the controls within a window, which also changes depending on the kind of container you're working in.

Thankfully, you needn't resort to the Information window for every small change. The Format menu allows you to modify font typefaces, sizes, and styles, as well as alter how numbers are formatted—select from decimal, date, and dollar, for example. You can't create additional tool-bar buttons—a feature Microsoft Word users will miss—but you can tear off menus to leave them visible at all times. Ripping menus away is rarely necessary, though, since RagTime includes palettes for controlling typographic settings, object coordinates, and spreadsheet and drawing commands.

Office Sweet RagTime 4.2 pages easily accommodate flowing text, dynamic spreadsheet containers, rotated text, and photographs.

A True Jack-of-All-Trades

The Swiss Army Knife analogy usually implies that a program offers a wide-ranging list of features but ignores the finer points. This is less true of RagTime than of programs such as AppleWorks. Although the mini-applications that operate within RagTime's containers may not be as powerful as the combined efforts of Microsoft Excel, Word, QuarkXPress, and Adobe Illustrator, they're hardly bare-bones. The spreadsheet component supports more than 200 functions and a wealth of chart types. Although RagTime doesn't offer the advanced flowing-text options of QuarkXPress, text does flow around containers that are in its path—and automatically reflows as you move elements. You can also scan directly into a container, using RagTime's TWAIN Acquire module, and then make scale, position, contrast, and color adjustments within a Picture Information window. Virtually every part of RagTime is scriptable. And as with Microsoft Office 98, you can save your files as HTML documents.

Although you can import and export common file types—EPS, TIFF, PICT, RTF, QuickTime, SYLK, and Microsoft documents (Office 98 converters will be available in an upcoming update)—there's a catch. You can export individual elements to applications that can read them—spreadsheet containers to Excel, for example—but you can export an entire RagTime document only as a PICT file.

Linkin' Ways

RagTime would be just another office suite—albeit a well-integrated one—if it weren't for the program's dynamic-linking feature. This free exchange of data among dynamically linked containers sets RagTime apart. You can implant a number field into a text container that's linked to a cell in a spreadsheet container. When you change the number in that cell, the number in the text container changes automatically—a helpful trick for dynamically updating invoices, cover letters, and other correspondence.

Likewise, with the optional $295 FileTime 4 extension, you can create a container that's linked to a FileMaker Pro database. When you make changes to the database, they're automatically entered into linked RagTime documents—mail-merge aficionados, take note.

Unfortunately, all this power has a price: a steep learning curve. Although the 223-page tutorial provides a decent overview, it skips many of the program's most powerful features. Armed with a few sample files, the terse reference manual, and the online help system, you'll eventually get your work done, but advanced users would appreciate a broader tutorial.

Macworld's Buying Advice

RagTime 4.2 is not for everyone. If you want to type a letter or create a simple spreadsheet, there are easier ways to go. If your work requires all the capabilities of a high-end dedicated application, you should use just that. But if your projects fall somewhere in between—newsletters, small publications, business forms and correspondence—RagTime 4.2 may be just the tool for you.—CHRISTOPHER BREEN

RATING: ♦♦♦♦ **PROS:** Powerful integration of document-processing tools; strong AppleScript support. **CONS:** Can't customize tool bars; hard to master; can't read Microsoft Office 98 files yet. **COMPANY:** ComGrafix (813/443-6807, www.comgrafix.com). **LIST PRICE:** $495.

Saphir

CAPABLE SCANNER, COMPLEX SOFTWARE

FLATBED SCANNERS HAVE undergone an astonishing evolution in the past few years. They now offer higher resolutions and wider dynamic ranges at ever lower prices, but in many cases, the software that lets you control the scanners has failed to keep pace. LinoColor Elite 5.1, which accompanies the Saphir flatbed scanner, from Heidelberg Color Publishing Solutions (formerly known as Linotype), is an exception to this rule. The scanner hardware is solid though unremarkable—it's a Umax PowerLook II (see "Scanners That Get the Details," December 1997) with a

ARNOLD TIOSEJO

different logo on the lid—but the unit's recently revamped software provides capabilities unmatched by that of other scanners in this price range.

The Saphir sports an integrated transparency attachment and captures 12 bits per color internally at an optical resolution of 600 by 1,200 dpi. It can scale images to 3,600 by 3,600 dpi, but these interpolated resolutions really prove useful only for line-art scans, where the software smooths jaggies but doesn't pick up any finer detail than you'd get from a 600-dpi scan. Its relatively low optical resolution puts the Saphir out of the running for tasks much beyond position-only scans from 35mm film, but its capabilities are sufficient to reproduce a 5-inch-square 120mm-format film image for medium-quality printing.

Heidelberg rates the Saphir's dynamic range at 3.0 OD, but our testing indicates that this is a conservative figure. Macworld Lab measured the scanner's useful dynamic range as closer to 3.2 OD—enough to handle any reflective original and all but the densest transparencies. Within the limits of the scanner's dynamic range and resolution, LinoColor Elite provides a degree of control and flexibility almost unheard-of in a relatively inexpensive flatbed scanner.

So what's the catch? LinoColor Elite is essentially the same software (minus a few hardware-specific productivity features) that drives high-end drum scanners with six-figure price tags. Although the Saphir can't match the quality of those beasts, it can come surprisingly close, but only after you've traversed a fairly steep learning curve. It's well worth investing the time to do so, but even experienced scanner operators will find that LinoColor Elite marches to the beat of a different drummer, and some may hate it on sight.

Heidelberg is partly to blame for some of the negative reaction. The company's "Color Is Child's Play" campaign is likely to raise the hackles of skilled scanner operators (who may dispute the notion that their job can be done properly by toddlers). Adding fuel to the fire, the claim that the Saphir scans in CIE-Lab color space introduces unnecessary confusion. Like all other scanners, this one scans in RGB, although the software does allow you to save your image directly to a CIE-Lab file without manually changing modes. In fact, thanks to LinoColor Elite's strong ColorSync support, you can create not only CIE-Lab files but also images in any CMYK or RGB color space for which you have a ColorSync profile.

All scanner controls are presented through an LCH (luminance/chroma/hue) interface. If you know absolutely nothing about color correction, you may actually find working in LCH quite intuitive, but if you're used to manipulating RGB or CMYK curves, it'll lead to some head-scratching at first. If you persevere, though, you'll find that LinoColor Elite offers very fine control over adjusting contrast, setting endpoints, controlling saturation, and even performing selective correction on individual color ranges—a feature most scanner software lacks.

To help you master the software's complexities (and to save effort once you've done so), a ColorAssist wizard lets you choose from a list of preset image types and performs image corrections automatically, letting you tweak the results if necessary. The software didn't do a stellar job on our challenging test image, but it performed well on less difficult images. LinoColor Elite makes all image corrections during the final scan, so they're applied to the 36-bit data the scanner captures. You wind up with a 24-bit file that's likely to need virtually no further editing—a real productivity advantage.

Manual Dexterity LinoColor Elite's ColorAssist feature does a good job on most images, but on particularly challenging material, you can obtain significantly better results with a judicious manual override. In the ColorAssist image (left), the red table came out too light and slightly orange, the white shirt is slightly pink, and the shadows on the white table have a magenta cast. Using LinoColor's manual controls allowed us to fix all these problems as well as oversaturation in the entire image (right).

Macworld's Buying Advice

The Saphir is an extraordinarily capable product for those serious enough about getting good color to learn the ins and outs of its LinoColor Elite software. The scanner's only real limitations are its resolution and dynamic range, both of which compare well with that of other scanners in this price range. If you can live with the limitations and you're prepared for some learning, you'll find the Saphir an excellent buy.—BRUCE FRASER

RATING: ♦♦♦½ **PROS:** Strong ColorSync support; unparalleled control over tone and color. **CONS:** Scanning application entails significant learning for effective use. **COMPANY:** Heidelberg Color Publishing Solutions (516/434-3012; www.linocolor.com). **LIST PRICE:** $1,099.

Digital-Audio/MIDI Sequencers

TWO MIDI PROGRAMS PACK A PUNCH

THE GREAT MIDI SEQUENCER Slugfest enters another round, with the release of Mark of the Unicorn's Digital Performer 2.4 and Opcode Systems' Studio Vision Pro 4.0. These MIDI-software rivals have been going head-to-head for years, trying not only to match each other's feature set but also to muster the knockout punch that would land the title Sequencing Champion of the World. It's a close contest this round, as each product delivers its fair share of blows.

Weighing In

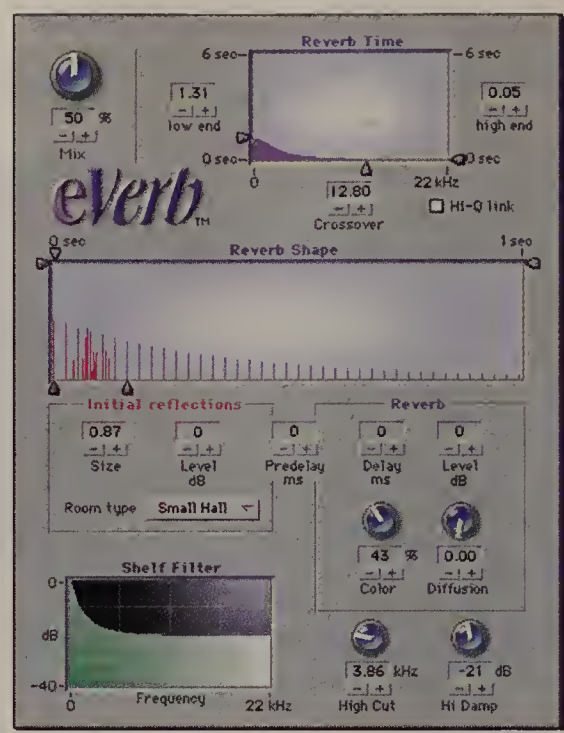
Digital-audio/MIDI sequencing programs are well past their adolescence. The basics were wrapped up long ago: list, piano-roll, and notation editing; MIDI-track overview; SMPTE synchronization; and synthesizer patch management. Even the ability to record, play back, and edit digital-audio files along with MIDI data is old news. Digital Performer and Studio Vision Pro are now mature applications whose newest revisions refine their existing capabilities and provide the latest and greatest features.

With these upgrades, both programs now support digital-audio fade and crossfade transitions. Both can now use Adobe Premiere–compatible effects plug-ins, and both support ProTools III/24—Digidesign's 24-bit, hardware-based digital-audio recording system. Unfortunately, both programs also share the same copy-protection headache: a key/floppy-disk scheme that will leave future floppy drive-less iMac owners in the lurch.

Head-to-Head

Studio Vision Pro and Digital Performer each have their own particular strengths and weaknesses. Your choice depends on the equipment you have in your studio, and your approach to sequencing.

If you're looking for the most complete MIDI/digital-audio solution right out of the box—and you don't already own external hardware effects boxes or lots of Adobe Premiere plug-ins—consider Digital Performer. It's bundled with effects plug-ins such as reverb, a tube preamp simulator, and a module that can add flanging and tremolo. Alas, Opcode bundles only the demo versions of its Fusion:Vinyl and Fusion:Vocode plug-ins (see *Reviews*, July 1998) with Studio Vision Pro, and doesn't include common effects at all.



Quite a Performer Digital Performer's effects include eVerb, a useful reverb plug-in.

Musicians with samplers will be interested in Digital Performer's new Samplers feature, a window that allows easy transfer of samples between a sampler and a Mac via Macintosh drag and drop. You can also drag samples to any Digital Performer window that supports audio.

It's a Groove Thang

Digital Performer has audio improvements, but Studio Vision Pro 4.0 has MIDI enhancements not found in Digital Performer. A notable addition is the Pulse Edit feature—a window specifically designed for creating and editing drum grooves. Just loop a measure or two, paint rhythms into the window's grid with the magic-drumstick tool, and you've built a massive groove. If you want to create rap or hip-hop tracks, this feature alone may steer you toward Studio Vision Pro.

Although both programs have made interface improvements, Digital Performer has the edge. For example, Digital Performer's QuickScribe window packs all notation features in a single window, whereas Studio Vision Pro forces you to switch between two notation views in order to prepare a score. Digital Performer's Mixing Boards window allows direct access to MIDI and digital-audio effects via pull-down menus, while in Studio Vision Pro you apply effects in a separate window.

However, when it comes to editing controller data (velocity, volume, and pitch-bend information) Studio Vision Pro's approach is superior, as its data is easier to see and edit. Digital Performer's data types are represented by teensy characters that are tough to select.

Macworld's Buying Advice

Digital Performer 2.4 and Studio Vision Pro 4.0 provide impressive new features and interface improvements, but these advances are unlikely to woo users away from their current professional digital-audio/MIDI sequencer packages. First-time buyers, however, face a tough decision—both products are mature, solid sequencers, and either is a good choice. Studio Vision Pro's new Pulse Edit feature is a groove-meister's dream, but Digital Performer's bundled effects plug-ins and interface tweaks are hard to resist. Although neither program packs the power to send the other down for the count, this round goes to Digital Performer.—CHRISTOPHER BREEN

Digital Performer 2.4

RATING: ♦♦♦♦½ **PROS:** Solid sequencer; bundled effects; improved interface. **CONS:** Clunky controller-data editing; copy protection. **COMPANY:** Mark of the Unicorn (617/576-2760, www.motu.com). **LIST PRICE:** $795.

Studio Vision Pro 4.0

RATING: ♦♦♦♦ **PROS:** Solid sequencer; groovier grooves with Pulse Edit window. **CONS:** Few bundled effects; copy protection. **COMPANY:** Opcode Systems (650/494-1112, www.opcode.com). **LIST PRICE:** $995.

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Web Tools for FileMaker

LASSO, TANGO, AND WEBFM PUT YOUR DATA ON THE WEB

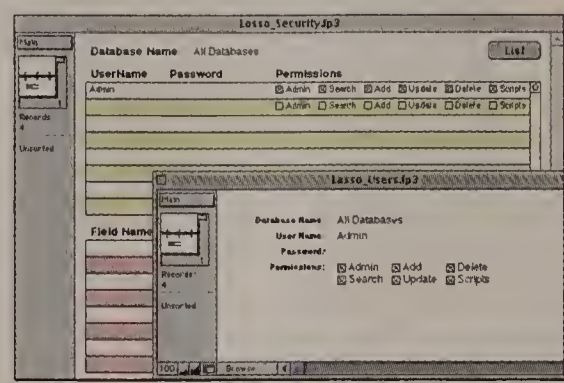
YOUR CAREFULLY DESIGNED order-entry forms and lavishly illustrated product catalog reside neatly in FileMaker Pro databases, but your potential customers are out there on the Web. How do you bring the two worlds together? You could use the Web tools built into FileMaker Pro 4.0, or FileMaker's Claris Dynamic Markup Language (CDML), which offers better control over searching and Web-page data exchange (see "Make FileMaker Work the Web," June 1998).

The next step up from CDML is a third-party product designed specifically to turn FileMaker Pro databases into interactive Web sites. Three such tools are Blue World Communications' Lasso 2.5, EveryWare Development's Tango 3.1 for FileMaker, and Web Broadcasting's WebFM 4.0. Although Lasso, Tango, and WebFM approach the same task in diverse ways and call for various levels of programming expertise, all three take a high-level approach to FileMaker-to-Web connectivity. If you're not a FileMaker developer or consultant, these products may be out of your league.

Tuning In to WebFM

WebFM uses FileMaker Pro calculation fields to hold HTML strings. Because it's a plug-in (for StarNine WebStar or server software compatible with WebStar's API plug-in standard), WebFM requires minimal coding to make FileMaker respond to commands issued through HTML pages. This minimalist approach pays off in speed; for simple searches of a 1,000-record test database, WebFM was quicker than Lasso and Tango.

You have to write some code to make your FileMaker database accessible from a Web site, but the WebFM manual documents the steps in detail. Version 4.0 bundles TagFM, which lets you use Claris Home Page or Bare Bones Software's BBEdit to build HTML pages with links to your FileMaker database; you simply select fields in a FileMaker layout and drag them onto the HTML page. The latest version also adds support for HTML template files, processor plug-ins, and e-mail transmission and archiving.



Easy, Now At its simplest level, Lasso asks you to make a few setup choices; the program's real power becomes apparent when you use LDML.

Serious, Speedy Lasso

If you've been practicing your basic CDML skills with FileMaker Pro but are looking for more power and convenience, then you're ready for Lasso. Essentially a feature-rich Web programming language with tags similar to those of CDML, Lasso is best suited to serious development efforts that aim for fast performance without sacrificing presentation complexity.

Using Lasso, you generate sets of documents with the proprietary Lasso Dynamic Markup Language (LDML); Lasso interprets the tags and translates them into FileMaker commands. Lasso's "programming language" tags—for control, common math functions, and string handling—let you speed up searches by controlling logical operations at the server end of the connection rather than in FileMaker itself. That's important, because FileMaker Pro is taxed to its limits by the high-traffic Web sites that businesses attempt to host on run-of-the-mill Mac hardware.

Tango Two-Step

Tango 3.1 for FileMaker is something of a paradox. It's easily the largest programming environment for publishing FileMaker databases to the Web, since it's designed to mediate between HTML pages and databases that understand SQL commands. Tango includes a Web server plug-in that interfaces directly with WebStar server software; another plug-in uses CGIs to manage Apple events.

For simpler Web tasks, such as assembling Tango query pages with links to FileMaker, the program also offers a visual, drag-and-drop system. That makes Tango the easiest of the three products for setting up basic Web-to-FileMaker links. But moving beyond the basics entails a long learning curve; the full Tango for FileMaker environment now includes a rich set of metatags, support for server-side Java and both server- and client-side JavaScript, and developer tools for packaging Tango-based applications for resale. It's also an excellent introduction to Tango Enterprise, a complete set of corporate database–to-Web tools that handle problems far beyond the scope of FileMaker Pro.

Macworld's Buying Advice

If you're doing an in-house project and need more features and speed than FileMaker Pro's own Web tools offer, WebFM is a good place to start. If you're responsible for publishing lots of FileMaker Pro databases, it's worth learning the details of the powerful Lasso. And if FileMaker Pro is likely to be just one part of your database world, Tango for FileMaker gives you the best Mac tools for attacking cross-platform, multiple-database problems.—CHARLES SEITER

Lasso 2.5

RATING: ♦♦♦♦½ **PROS:** Easy step up from FileMaker's Web tools; good performance. **CONS:** Requires considerable FileMaker training. **COMPANY:** Blue World Communications (425/646-0288, www.blueworld.com). **LIST PRICE:** CGI and plug-in, $449; server version, $599.

Tango 3.1 for FileMaker

RATING: ♦♦♦♦ **PROS:** Complete Web interface for FileMaker with powerful query language; visual-programming approach is effective for simple projects. **CONS:** Full environment calls for serious programming background. **COMPANY:** EveryWare Development (905/819-1173, www.everyware.com). **LIST PRICE:** $650.

WebFM 4.0

RATING: ♦♦♦♦ **PROS:** Fast; conceptually simple; works entirely within FileMaker. **CONS:** Not intuitive for nonprogrammers. **COMPANY:** Web Broadcasting (650/329-9676, www.webfm.com). **LIST PRICE:** $395.

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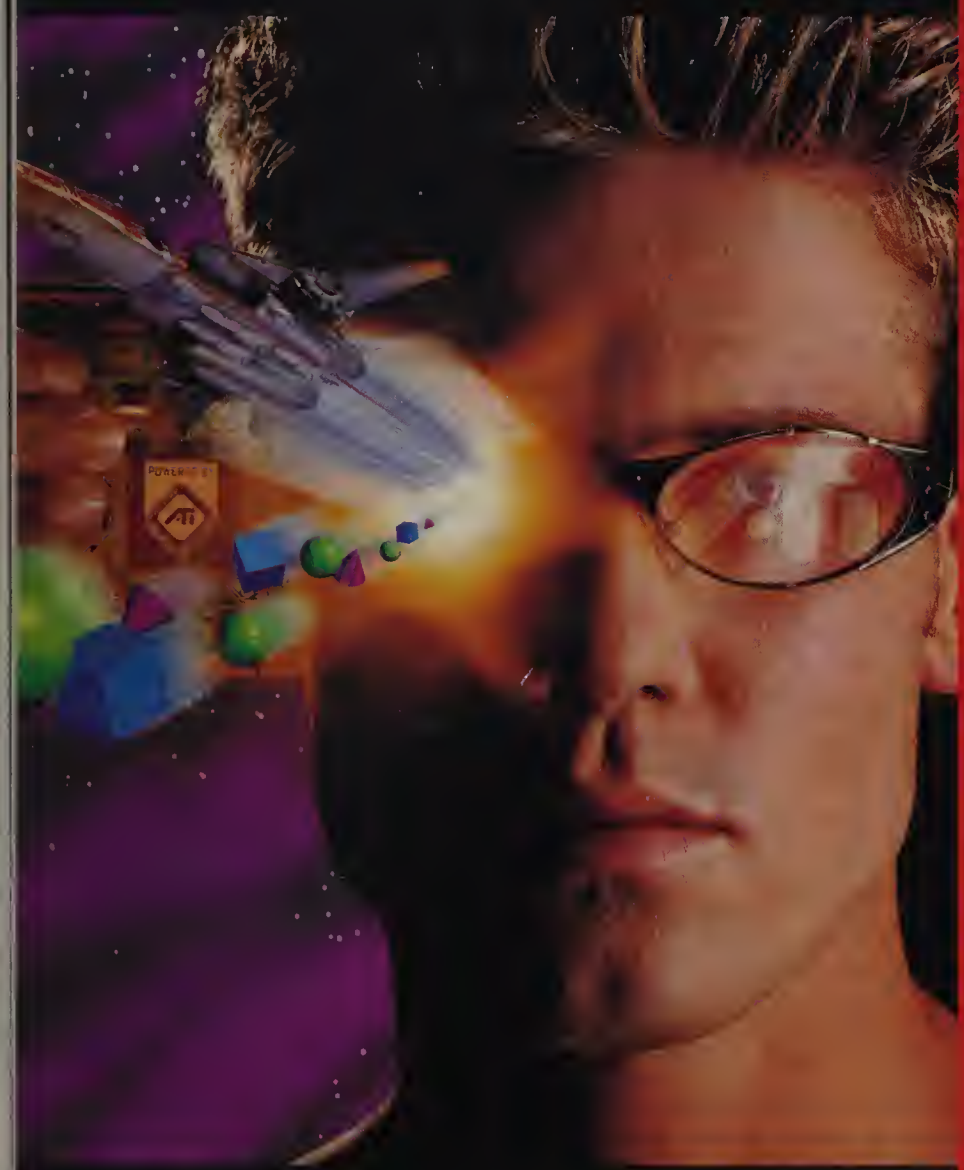

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DeBabelizer 3.0

GRAPHICS PROCESSOR GAINS POWER BUT LACKS POLISH

DEBABELIZER'S ABILITY TO automate a wide variety of tedious graphics manipulations for multiple files in a single pass has made it an essential tool for graphic artists. With Equilibrium DeBabelizer 3.01, the first major upgrade since 1995, the program has acquired an updated interface, new file-format support, easier scripting, and many other welcome enhancements. Nagging flaws and an exceedingly steep learning curve, however, make for mixed success overall.

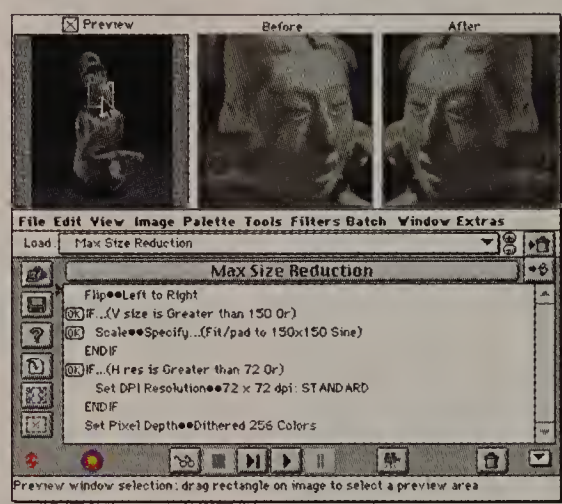
More Than a Face-Lift

DeBabelizer's most obvious change is its redesigned interface. Replacing the old, inadequate Image Info window is a handy, window-specific pop-up list of statistics and a full-time tool bar with new rectangle, line, and text tools. An info bar displays either tool names or pixel-by-pixel position and color information, depending on the pointer's location.

DeBabelizer's menus have been reorganized—sometimes helpfully, sometimes not. The dialog boxes also have been redesigned; several now offer useful preview images (see "Screen Test"), although many are still overcrowded and confusing. There's now no limit to the number of open images, and DeBabelizer's drag and drop is remarkably versatile.

Version 3 also contains several new built-in filters, is compatible with a wider variety of third-party Adobe Photoshop 4 plug-ins, supports CMYK images, and has added new graphics file formats (including progressive JPEG, animated GIF, 16- and 32-bit Windows BMP, and QuickTime 3.0). A major drawback with animation and QuickTime files, however, is that they usually can be viewed only one frame at a time.

Many new functions have been added and old ones improved. You can now rename hundreds of files with a single command and save processed files with new names using variables such as date or image resolution. DeBabelizer can automatically run a designated process on an image dropped into a user-defined "hot" folder; the new Batch Automation dialog box semiautomates the most commonly performed tasks. You can create multi-image, optimized SuperPalettes based on any existing palette. And you can now store different scripts, palettes, and BatchLists in different preference files; if



Screen Test DeBabelizer's Script window lets you select part of the active image and see what happens when you apply the current script to it.

you specify a drag-and-drop script for each preference file, dropping an image onto the appropriate file processes it automatically with the specified script.

DeBab Does Windows

A new Script window makes DeBabelizer scripts far easier to write, revise, and preview. New commands insert scripts within scripts, run key-triggered macros, and set IF-THEN-ELSE conditions for designated commands. Run, Pause, and Single Step buttons make it easy to test scripts, view the results of each operation on a test image, see which line is executing, and start a test at any point.

Similarly, a new BatchList window makes it easier to maintain lists of images to process. In addition to files stored in folders, DeBabelizer can now import and process images from Web pages, scanners, and digital cameras. Pointing to any image in a BatchList opens a thumbnail view and a summary of vital statistics, and BatchList window buttons initiate popular batch automations for the current list. A new batch-progress window indicates the current job status and estimated time remaining and lets you cancel a batch process, reset options, and skip files.

Annoyingly, the BatchList and Script windows can't be enlarged to accommodate longer file names or lengthy lists of files or commands. And both are always the topmost windows, covering all other windows—including the Error Log.

Pity the Poor Beginner

Unfortunately, several of DeBabelizer 3.01's functions don't work correctly. One is Change String, part of the Rename Files In Folder command: it loops back and changes file names it has already changed, making a mess if the search string appears in the change string (imagine the results of changing *D* to *Dresden*). Another problem is that unsuccessful PC-to-Mac TIFF conversions sometimes aren't reported in the Error Log, forcing you to check them one by one. And DeBabelizer crashes if you open an image larger than it can handle.

If you're not familiar with DeBabelizer, there's more bad news. The program doesn't suffer inexperienced scriptwriters gladly, and the results of its poor error-trapping range from infinite loops to a frozen machine. Although trial and error is often necessary to perfect a Batch Automation process, DeBabelizer doesn't save your settings if you cancel one in progress. Turning on the Script Preview option or failing to save your BatchList changes can have thoroughly puzzling consequences. And DeBabelizer still has a remarkably steep learning curve that's not alleviated by the lengthy manual, which ploddingly explains the program option by option rather than task by task.

Macworld's Buying Advice

For automating image processing of all kinds, DeBabelizer remains the only game in town. Once mastered, it can forever relieve you of tedious repetition. It remains expensive and hard to learn, however, and is marred by a number of flaws. DeBabelizer is a good program and a strong graphics workhorse; it deserves to be better.—ROBERT C. ECKHARDT

RATING: ♦♦½ **PROS:** Improved interface; expanded repertoire of graphics manipulations; additional graphics-format support. **CONS:** Awkward animation and QuickTime handling; poor error trapping; design and performance flaws; steep learning curve; pricey. **COMPANY:** Equilibrium (415/332-4343, www.equilibrium.com). **LIST PRICE:** $599 (upgrade $149).

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MIDI Accompaniment Software

YOUR OWN PERSONAL BACKUP BAND

AT SOME POINT EVERY MUSIcian thinks, "Wouldn't it be great if I could hire a round-the-clock backup band that didn't complain every time I hit a clinker?" Alas, retaining a group of uncritical musicians is beyond the means of most mortals. However, PG Music's Band-in-a-Box 7.0 and Cakewalk's In Concert 1.0 provide the next best thing.

Band-in-a-Box and In Concert are MIDI-based auto-accompaniment applications. They supply the band, and you deliver the melodies and solos. The main differences between them are in their ability to interact with the user and to generate accompaniments in a variety of styles. Band-in-a-Box cranks out accompaniments in various styles as you play melody on any type of instrument, while In Concert "listens" to you and changes the tempo of its accompaniment to match what you play on your MIDI instrument.

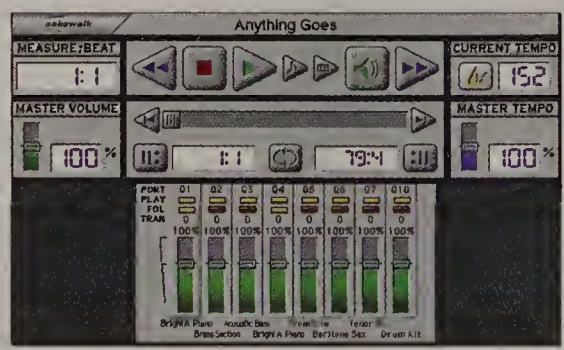
Attentive Musical Sidekick

In Concert keeps tabs on your playing by using a *follow track*—a track, incorporated into the MIDI file, that's a duplicate of the melody you play. It compares this track with your playing, and when it senses that you've sped up or slowed down, it adjusts the accompaniment tempo to match. If the notes you play differ from what the program expects—if you skip a repeat, for example—In Concert reassesses where you are in the piece and shifts its accompaniment to that spot.

Consequently, for In Concert to work correctly you must play the notes it expects to hear, and refer to sheet music that duplicates the follow track. The software is bundled with 40 scores and their accompanying MIDI files, all intended for keyboard players (other MIDI instrumentalists will have to seek out their own appropriate scores and files).

You can specify how closely In Concert pays attention to your tempo changes with its sensitivity control. The lower the sensitivity setting, the more inclined In Concert is to lead rather than follow—a benefit for those seeking a musical metronome. At the highest sensitivity level, In Concert capably followed my playing and handled extreme changes well.

You can increase In Concert's repertoire by purchasing additional MIDI file–and–songbook packages. Or you can create your own arrangements in a MIDI sequencer such as Opcode's Music Shop,



You're Being Followed In Concert's straightforward interface lets you easily tweak how intently the program follows your keyboard playing.

Steinberg's Cubasis, or Mark of the Unicorn's FreeStyle. After you create your arrangement, print out the melody to refer to while playing. Then open the MIDI sequence within In Concert and designate the melody as the follow track.

Just Jammin'

If you simply want to pick up any instrument and jam along with a band, Band-in-a-Box is the better option. Band-in-a-Box can't follow what you play, but that relieves it from being dependent on a MIDI controller. Although the software still requires a MIDI output device (a synthesizer or QuickTime Musical Instruments) to play the backing tracks, you can play along with it on any instrument—even your sax or xylophone.

Band-in-a-Box's strength is its ability to create countless variations of accompaniment in a wealth of styles—jazz, country, rock, Latin, bluegrass, and polka, to name a few. The basic version of the program comes with more than 100 different styles, all of which include bass, drum, and piano; some styles throw in strings and guitar as well. (The $249 Mega-Pak version has 300 music styles.)

Band-in-a-Box ships with several demo songs, but the real fun is in creating your own arrangements. Click on the first measure of the Band-in-a-Box worksheet, type in a chord such as F#7, and press the right-arrow key to enter the next chord. When you've finished entering chords, choose a music style such as bluegrass, and wait for Band-in-a-Box to create a down-home bluegrass arrangement.

Although Band-in-a-Box's arrangements aren't note-perfect, they're convincing enough that you'll have a swell time jamming along with them. What isn't so hot is the new Soloist feature; this "intelligent" solo generator creates melodies based on a particular musical style—Miles Davis's muted trumpet, for example. Regrettably, many of the solos just don't cut it.

Band-in-a-Box also has one of the messiest interfaces known to Mac, marred by too many dialog boxes, initials instead of words in the menu bar, and primitive controls for creating new styles. Yet this program is like the tarnished old saxophones carried around by serious jazz cats—unattractive on the outside but with some sweet music hidden within.

Macworld's Buying Advice

In Concert and Band-in-a-Box are useful, entertaining tools for MIDI musicians dreaming of accompanists on call. Keyboard players who prefer to work from sheet music and want a program that follows their lead will sing the praises of In Concert. Players who desire a casual backup band with bossa nova, bluegrass, and bop flavors will find Band-in-a-Box a kick.—CHRISTOPHER BREEN

Band-in-a-Box 7.0

RATING: ♦♦♦½ **PROS:** Decent musical arrangements in a large variety of styles. **CONS:** Cluttered interface; built-in "soloists" need more practice. **COMPANY:** PG Music (250/475-2874, www.pgmusic.com). **LIST PRICE:** $88.

In Concert 1.0

RATING: ♦♦♦♦ **PROS:** Easy to use; responsive automatic tempo adjustment. **CONS:** Includes only 40 tunes. **COMPANY:** Cakewalk (617/441-7870, www.cakewalk.com). **LIST PRICE:** $149.

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Studio Display

LIMITATIONS MAR STYLISH MONITOR

APPLE'S EYE-CATCHING LCD-panel display may set new standards of grace and style, but with a price close to $2,000, it's really more of a costly status symbol than a truly innovative monitor alternative. Although the Studio Display provides an exceptional example of how far LCD technology has come, it also demonstrates that even high-quality thin-film-transistor (TFT) flat-panel technology can't provide the image clarity and color accuracy of a traditional monitor.

But limitations are far from the first things that leap to mind when you see the trim, 6-pound, 15.1-inch Studio Display. Its design language speaks of a future when desktop computers have broken free of the putty-gray monotony that has trapped them for well over a decade. Unfortunately, that day hasn't yet arrived, and the Studio Display's translucent blue shell clashes mightily with traditional keyboards and mice.

In fact, the Studio Display looks positively silly when propped atop a desktop Mac—it's clearly meant to command its own desk space, and Apple provides two ways of setting it up. The versatile, 4.6-pound Desktop Stand offers a wide tilt-and-swivel range and the ability to raise and lower the display so that the top is between 15 and 20 inches above the desktop. When mounted on the Desktop Stand, the Studio Display is a mere 10 inches deep—a clear benefit of LCD technology. A small, feather-light Flip-Out Stand, perfect for travel, is also included; it easily attaches, easel-like, to the back of the Studio Display.

It's a snap to set up the Studio Display. Power, graphics-card, and ADB cables are built in, and Apple includes an ADB-cable extension for use with the Desktop Stand. Full S- and C-Video support is included (compatible with NTSC, PAL, and SECAM formats), along with RCA audio-in and miniheadphone audio-out ports.

Software installation is equally straightforward: a Flat Panel window added to the familiar Apple Displays Software feature makes it easy to perform all screen adjustments—it's a simple matter to fine-tune the Studio Display and tweak its ColorSync profile.

But after setup is complete, your love affair with this sleek monitor may begin to cool. It's a TFT LCD panel, after all—its image quality simply can't match that of a top-notch CRT. For example, at its maximum resolution of 1,024 by 768 pixels (24-bit color), image clarity is quite good, but as you lower the resolution from 832 by 624 through 800 by 600 to 640 by 480, sharpness deteriorates because lower resolutions are antialiased across a fixed, 1,024-by-768-pixel grid.

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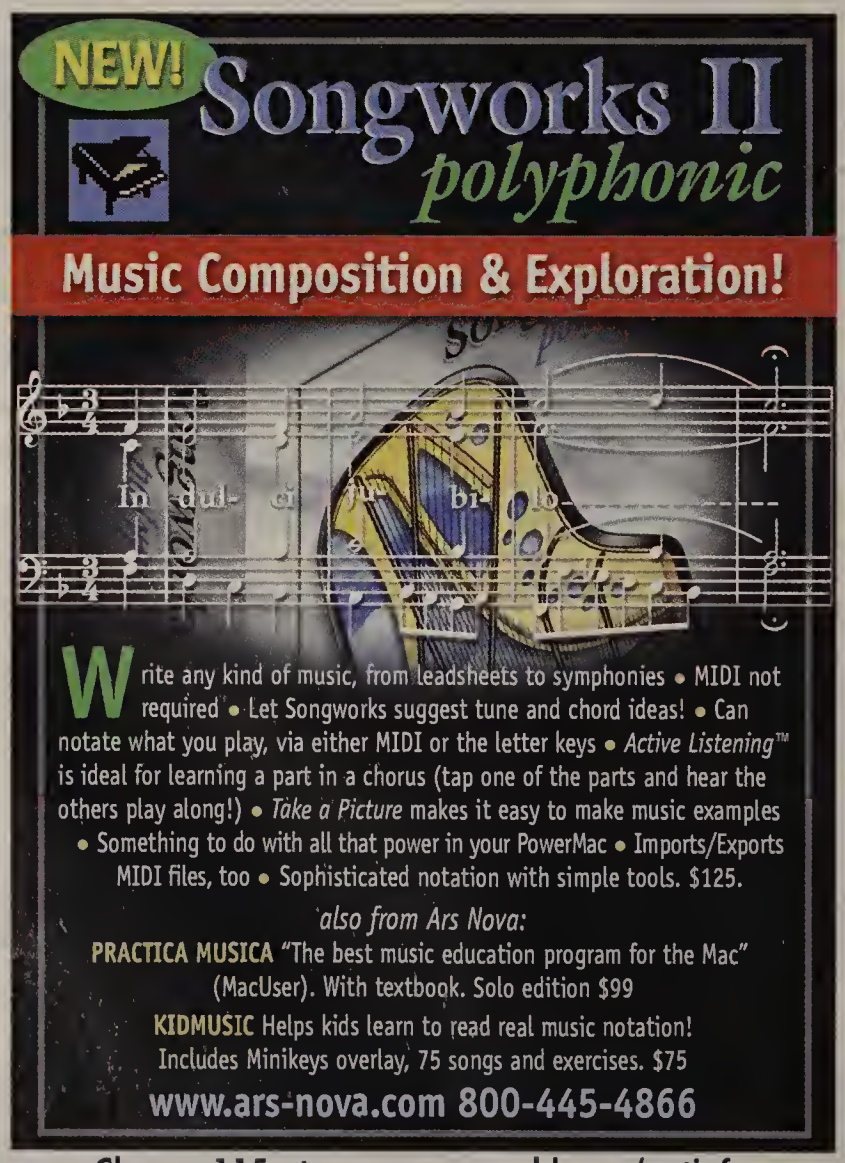
More disturbing, however, is that TFT LCD displays are designed to be viewed head-on and that their color accuracy visibly changes if you vary your viewing angle even slightly. The Studio Display (which overcomes these limitations as well as or better than any TFT LCD display to date) is no exception: both hue and saturation dramatically shift if you merely slump in your seat.

Macworld's Buying Advice

Don't let its name mislead you: the Studio Display may have come *from* a design studio, but it's not suited for use *in* a design studio. Despite its excellent software, the Apple Studio Display remains constrained by the limitations of LCD technology, especially in the area of color accuracy.—RIK MYSLEWSKI

RATING: ♦♦♦½ **PROS:** Compact, eye-catching industrial design; easy-to-use software; excellent brightness and contrast; good sharpness at maximum resolution. **CONS:** LCD technology's color variability limits design and publishing use; poor sharpness at low resolutions. **COMPANY:** Apple Computer (408/996-1010, www.apple.com). **COMPANY'S ESTIMATED PRICE:** $1,999.



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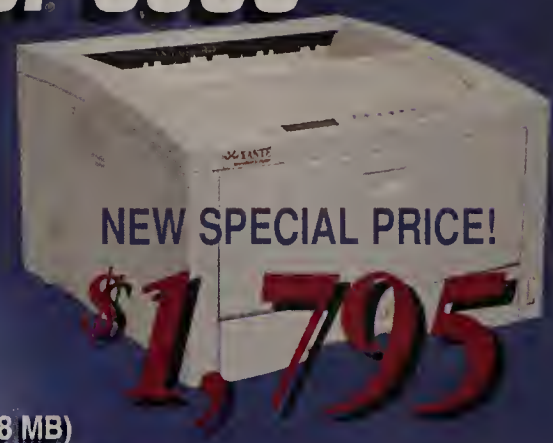

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Jaz 2GB

SPEED DOESN'T MATCH HIGH PRICE

THE LATIN WORD *SOPHOMORE* roughly translates as "wise fool," and it's a term that aptly characterizes the second incarnation of Iomega's Jaz drive. Iomega has carefully refined its winning high-capacity removable-storage formula, but effectively nullified its good work with a number of design missteps and an outrageously inflated price.

As the name implies, Jaz 2GB cartridges hold up to 2 gigabytes of data; the drive can also read and write to older 1GB cartridges, preserving your media investment. In addition to the drive's increased capacity, Iomega equipped the drive with a faster Ultra SCSI interface, which can boost performance by around 30 percent.

But while these improvements sound great, details bring the Jaz 2GB back down to earth. You can take advantage of the Ultra SCSI interface only if you install

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an Ultra SCSI card, which costs at least another $100. Without the card, Macworld Lab tests show, the 2GB Jaz isn't meaningfully faster than the 1GB Jaz.

And although the new Jaz reads older 1GB cartridges at normal speed, writing files to 1GB cartridges slows performance to a crawl. The new drive's larger cartridges are more expensive than their 1GB predecessors—they cost $149 each in packs of three, versus $89. The 2GB cartridges are actually slightly cheaper per megabyte, though, thanks to their increased capacity.

As you'd expect from Iomega, the 2GB Jaz is a sleek package. But although the redesigned case looks cool, Iomega eliminated the handy side-stand feet.

At least the drive is still a snap to install—just plug in the SCSI cable and run the installation application. Iomega also includes handy utilities, among them Dantz's DiskFit Direct backup software and Iomega's Guest software, which lets you use your Jaz drive on another machine without performing a full install.

The Jaz 2GB's flaws aren't significant until you consider its price tag. At $649, the device is more than twice as expensive as the $299 Jaz 1GB.

Macworld's Buying Advice

The Jaz 2GB will likely appeal to highly paid multimedia producers with unlimited hardware budgets, especially those whose Macs already sport a chain of Ultra SCSI devices. But mainstream users will find it tough to reconcile the Jaz 2GB's hefty cost with its marginally improved perfomance.—CAMERON CROTTY

RATING: ♦♦½ **PROS:** Snazzy design; increased capacity. **CONS:** Twice as expensive as 1GB model but no faster. **COMPANY:** Iomega (801/778-1000, www.iomega.com). **LIST PRICE:** $649.

Macworld LAB TEST

Jaz 2GB: Not Appreciably Faster

Best result in test. All times are in seconds. Shorter bars and lower numbers are better. Products listed in order of overall performance. ► New product.

	Copy to Drive	Open Photoshop File	Save Photoshop File	FileMaker Search/Sort
► Iomega Jaz 2GB	8.6	26.2	27.5	36.6
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Iomega Zip Plus	17.8	57.5	65.5	91.5
Iomega Zip	19.0	58.7	59.9	135.0

Behind Our Tests All tests were conducted using a Power Macintosh 7300/200 with 32MB of RAM and Mac OS 8.1 installed. For detailed information on our tests, see www.macworld.com/tests/.—**Macworld Lab testing supervised by Gil Loyola**

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Grammarian

SYNTAX CHECKER NEEDS SUPERVISION

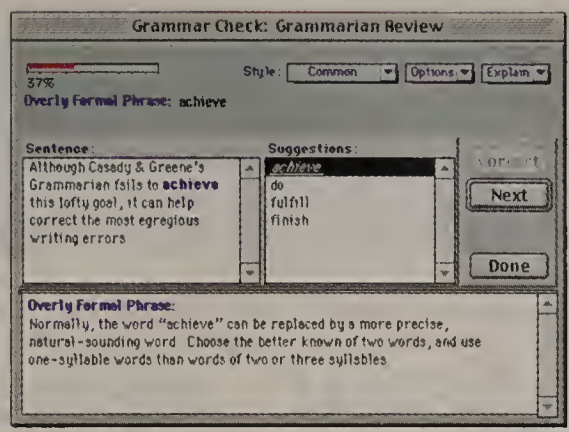
THROUGHOUT HISTORY THERE have been many epic quests—hunts for the Holy Grail, the Fountain of Youth, and the Seven Cities of Gold, for example. In modern times, only one quest matches the scope of these legendary pursuits: the search for a grammar checker that puts an end to slovenly writing. Although Casady & Greene's Grammarian fails to achieve this lofty goal, it can help correct the most egregious writing errors.

After you install Grammarian, a new menu appears in supported applications, which include common word processors, page-layout tools, and e-mail clients. (You can also add your favorite programs to Grammarian's list in its control panel.) This menu contains commands such as Check All Grammar and Check Selection Only, as well as a command for enabling Interactive Checking, a feature that lets Grammarian alert you when you complete an objectionable sentence. From this menu, you also choose Writing Rules to determine the kinds of grammatical errors you'd like Grammarian to flag. The variety of errors is impressive, ranging from common problems such as article-and-noun agreement and incorrect hyphenation to common yet inadvisable practices that include employing clichés and sexist expressions.

When Grammarian finds a problem, it places the suspect sentence in a window and offers an explanation and common example of the error. If Grammarian can fix the problem, you can press the return key and Grammarian enters the correction. More often, however, Grammarian offers alternate word choices or instructs you to rewrite the sentence. Once you've completed the grammar check, Grammarian displays statistics that rank your prose in terms of reading ease, grade level, and human interest.

How helpful you find Grammarian depends largely on how well you write. The program could be a lifesaver if you routinely violate common grammatical rules such as mixing up *it's* and *its* or neglecting to place punctuation inside quotation marks. It also spots subtler errors, such as the use of passive voice.

But in many cases, I took issue with Grammarian's judgments. For example,



Spot the Error In this case it seems Grammarian's error detection should have started closer to home.

it couldn't recognize that *Casady & Greene* is singular rather than plural, nor did it care for the phrase *employing clichés*, preferring instead the drab *using clichés*. In addition to these somewhat understandable lapses, the program was occasionally outright wrong, such as suggesting *you're* when the contraction was uncalled for. And Grammarian's inconsistent interactive mode dutifully appeared when I used the slang word *gonna* in an e-mail message, but refused to materialize after I used the passive voice.

Grammarian doesn't tackle minutiae such as serial commas or spaces around dashes, most likely because these sorts of stylistic dictates vary from publication to publication. Grammarian could benefit from at least flagging inconsistencies in these cases, or taking its direction—perhaps via plug-in modules—from popular style guides like the *Chicago Manual of Style*. You can, however, disable a class of errors, such as avoiding slang or flagging unnecessary semicolons.

Macworld's Buying Advice

Compared with previous grammar checkers, Grammarian is a decided step forward. It's no replacement for a trained editor, but it goes into far more detail than most word processors' grammar tools. Its ability to deal with an exhaustive variety of grammatical infractions is admirable. However, its advice is most useful when filtered through a layer of skepticism.—CHRISTOPHER BREEN

RATING: ♦♦♦ **PROS:** Tracks grammar errors large and small. **CONS:** Suggestions can be unreliable. **COMPANY:** Casady & Greene (408/484-9228, www.casadyg.com). **LIST PRICE:** $79.95.

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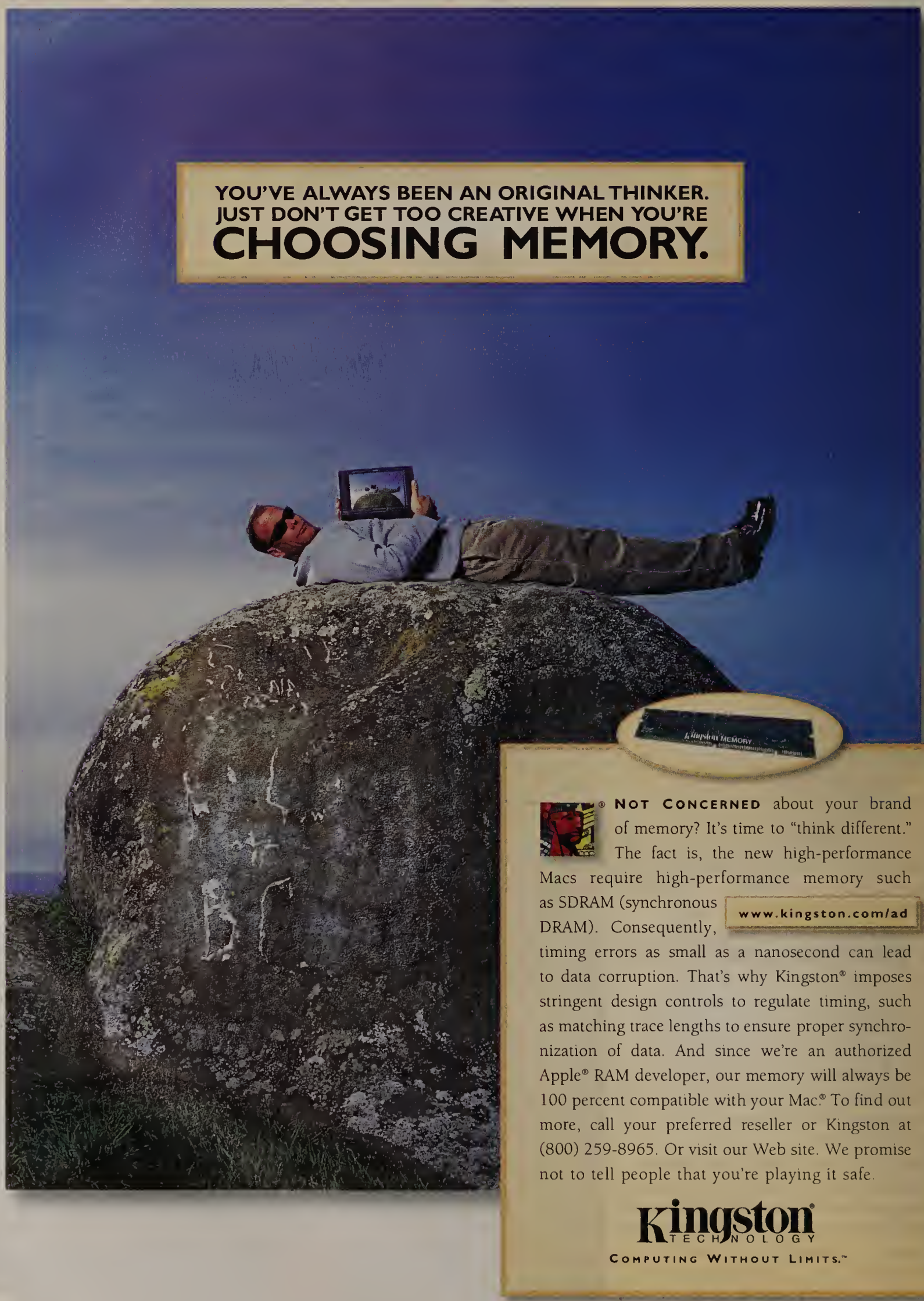

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Inspire 3D

LIGHTWAVE POWER WITHOUT THE PRICE

EARLY ON IN THE WORLD OF 3-D, NewTek's LightWave established itself as an industry mainstay for 3-D modeling, rendering, and animation. NewTek has repurposed LightWave, originally developed for the Amiga, into a more entry-level product called Inspire 3D. With a few exceptions, Inspire 3D 1.0 offers most of LightWave's power and functionality—and learning curve—for about one-fourth the price. It's a good choice if you're looking for the maximum bang for your buck, particularly if you plan to migrate to LightWave.

Inspire 3D's fully integrated modeling, rendering, and animation features are divided into two modules. You do all geometry creation in Modeler, while handling lights, camera, animation, and rendering in Layout. This division might be a bit confusing for 3-D novices, but Inspire makes it easy to switch between the modules.

Inspire 3D contains a subset of LightWave's tools, including advanced functions such as NURBS modeling, motion blur for animation, and excellent C-curve–editing control over animation keyframes. Inspire also allows morphing between 3-D shapes, though the beginning and final shapes must have the same number of polygons; that limits this feature's usefulness to specific animation tasks, such as lip-sync deformations.

Most of LightWave's advanced ray-tracing features made it into Inspire 3D. The main difference between the two applications is the maximum render resolution for animation files. Inspire 3D is limited to 640 by 480 pixels—a definite problem if you want to create PAL-compatible animation, which has a resolution of 720 by 486 pixels. However, you can generate high-resolution still images.

Inspire 3D also lacks LightWave's distributed-network rendering, along with some critical LightWave features geared toward character-animation tasks, such as inverse kinematics and metaballs. Inspire 3D does include a fairly full implementation of bone-based deformations; a variety of sample scenes and objects; decent print documentation, although it's not always pertinent to the Macintosh; and an entire CD-ROM containing a slickly produced, interactive tutorial.

The problem with Inspire 3D lies in its interface: the program looks and feels distinctly un–Mac-like and will frustrate the average Mac artist. Advanced 3-D artisans might argue that the streamlined interface is designed for maximum productivity. While that argument has some merit, the interface is still annoying; for example, the antialiasing options are tucked away in the Camera Control dialog box rather than in the Render dialog box, where you'd expect to find them.

Getting Inspired Inspire 3D's Lights Panel presents a spotlight's parameters in numeric form, although a visual display of spotlight shape and falloff might be more useful.

Macworld's Buying Advice

The feature-laden, full-powered Inspire 3D aims for the middle of the 3-D market but sports capabilities usually reserved for more-expensive packages. Although its decidedly non–Mac-like interface betrays the program's heritage, Inspire 3D is great for aspiring LightWave artists looking to learn the interface before investing in the more expensive package. If you don't fall into this category, consider MetaCreations' Infini-D or Ray Dream Studio. If you do want to make the transition to the world of LightWave, however, Inspire 3D is the easiest way to get . . . well, inspired.—DAVID BIEDNY

RATING: ♦♦♦½ **PROS:** Extremely robust modeling tools; professional rendering options; good interactive tutorial. **CONS:** Nonstandard interface; difficult to learn. **COMPANY:** NewTek (210/370-8000, www.newtek.com). **LIST PRICE:** $495.

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GyroPoint Pro II

CORDLESS MOUSE LETS YOU POINT AND CLICK WHILE ON YOUR FEET

GIVING A PRESENTATION ON your Mac can be a frustrating experience if you like to wander around the room while speaking to your audience. Even if your pointing device has a long enough cord, a suitable work surface usually is nowhere to be found. iXMicro's GyroPoint Pro II solves this common problem by untethering your mouse from your computer.

Unlike cordless pointing devices that use infrared light to communicate, the GyroPoint Pro II sends radio waves to a compact receiver that connects to the Mac's ADB port. (A separate cord for PCs also comes in the box.) You can position the receiver anywhere near the computer, as long as it's not on top of a monitor or projector. Switches inside the GyroPoint Pro II's battery compartment and on the receiver let you specify one of 16 unique frequency settings, ensuring that signals from two GyroPoint devices won't conflict with each other.

The jet-black GyroPoint Pro II is shaped like an elongated jumbo egg, and it

MICHAEL FALCONER

fits comfortably into the palm of either hand. Dual buttons on the top of the unit take the place of the button on a standard mouse. (Alas, there's no software to let you program the buttons to perform different functions.) A recessed switch between the buttons turns the GyroPoint Pro on, lighting a small green LED. iXMicro claims that most users should expect about 60 hours of use from two AA alkaline batteries.

Like its predecessors (see *Reviews*, July 1996), the GyroPoint Pro II operates by sensing the motion of your hand using a small internal gyroscope. To move the cursor, you press a button on the bottom of the mouse with your index finger and point your hand in the direction you want the cursor to go. The instant you release the button, the cursor stops moving; you can keep the cursor alive by double-clicking the bottom button. Even with small screens, it helps to reset the Mouse control panel's tracking speed to the highest level.

Learning to use the GyroPoint Pro II is a breeze. I had no difficulty using it with my PowerBook in a medium-size auditorium, even while sitting in a control room more than 50 feet from the computer. Because the GyroPoint Pro uses radio waves instead of infrared light, you don't have to maintain direct line-of-sight contact with the receiver. The GyroPoint Pro also worked well with my desktop Mac, although it's clearly not the best choice for cursor-intensive work like word processing or drawing.

Macworld's Buying Advice Although you could use the GyroPoint Pro II to surf the Web from your armchair, it really shines as a pointing device for stand-up presentations. If you have to use your Mac while you're on your feet, the GyroPoint Pro II is an excellent choice.—FRANKLIN TESSLER

RATING: ♦♦♦♦ **PROS:** Doesn't require line-of-sight contact; works with both Macs and PCs. **CONS:** Lacks button-customizing software. **COMPANY:** iXMicro (408/369-8282, www.ixmicro.com). **COMPANY'S ESTIMATED PRICE:** $119.

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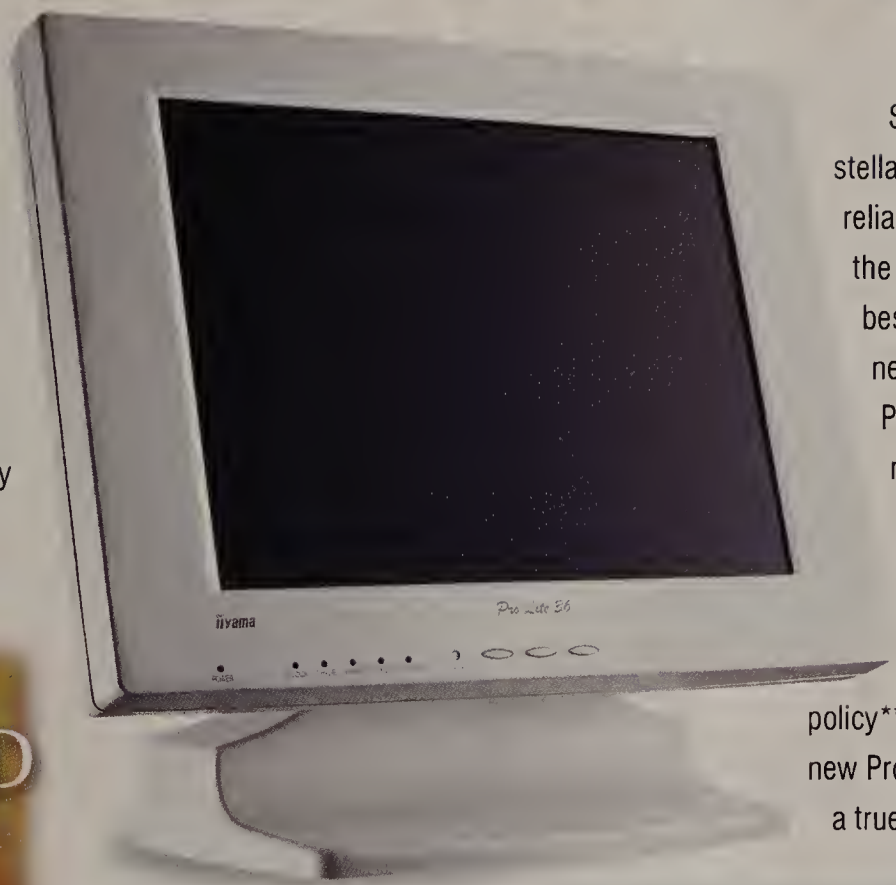

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PC Magazine Best of 1997 — January 6, 1998, VisionMaster Pro 17

Catalyst Labs Highly Recommended 1998 — *Perfect Five-Star Rating*, January 1998, VisionMaster 450, VisionMaster Pro 500

ComputerLife — *Perfect Five-Star Rating*, November 1997, VisionMaster Pro 17

Reader's Choice Reseller News — *Performance & Technical Excellence*, March 1997, VisionMaster Pro 21

MW Editors' Choice — *Six Time Winner*, Jan 1997, Feb 1997, March 1997, April 1997, May 1997, June 1997, VisionMaster Pro 21

PC Magazine Editors' Choice — October 7, 1997, VisionMaster Pro 17

Catalyst Labs 4½ Star Rating 1998 — March 1997, VisionMaster Pro 21

PC World Best Buy — *Seven Time Winner*, July 1996, Jan 1997, March 1997, July 1997, Sept 1997, Jan 1998, May 1998, VisionMaster Pro 17, April 1998, VisionMaster 450

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Olympus P-300

SNAPSHOT PRINTER DONE RIGHT

EVERY INNOVATION INTERRUPTS the established routine, and digital photography is no exception. In the traditional snapshot scenario, you shoot a few pictures with a 35mm film camera, take the exposed film to a lab, and receive a packet of prints in return. But when you go digital, the prints become your responsibility. You can send your images to a color ink-jet printer, but by and large, they won't look as good as the glossy film prints you're accustomed to getting from a photo finisher. If you want the best of both worlds—digital control and film-quality output—then you need a dedicated snapshot printer. The best one I've seen is the $399 Olympus P-300.

Dye-sublimation devices such as the P-300 produce continuous-tone images that have none of the dot patterns associated with ink-jet and laser output. And provided that your digital image contains enough data—ideally, 1,280 by 960 pixels or more—the printer's 306-dpi resolution all but eliminates stairstepping and jagged edges. But the biggest surprise about this little printer is its color quality. In tests with Adobe Photoshop 5.0, the P-300 printed truer colors than any comparable device, including our hitherto favorite snapshot printer, the $499 Fargo FotoFun (see *Reviews*, November 1997).

Fun with Photos The Olympus P-300 print (top) is a dead ringer for the original 1,280-by-960-pixel screen image, but the Fargo FotoFun print (bottom) suffers from a distinct green cast and softer focus.

Color isn't the P-300's only advantage over the FotoFun. Its driver software provides more output controls, permitting you to sharpen a snapshot and preview your settings before you print. And where the FotoFun requires you to hand-feed each sheet into the printer, the P-300 includes a paper tray that holds up to 30 pages. A single fingerprint can keep dye-sub ink from sticking to a page, so it's a good idea to touch as few sheets as possible.

The P-300's downsides are the same as those for the FotoFun and its ilk. The maximum paper size is 4 by 5 inches, which is great for snapshots but nothing larger. The cost of consumables is high: a paper-and-ink kit costs $35 for 60 sheets, or 58 cents a page—about equal to what you would pay for traditional film and development. And that's not even counting the fact that your local photo hut does not require you to buy a $400 piece of hardware.

Macworld's Buying Advice For those who can reconcile the expense, this compact printer delivers first-rate snapshots in record time. If you own an Olympus digital camera (any model from the D-200L to the D-600L), you can avoid the Mac middleman and print directly from your camera to the P-300 in about three minutes—roughly 20 times faster than the fastest quick-photo lab. For those on the prowl for immediate satisfaction, it doesn't get much better than this.—DEKE McCLELLAND

RATING: ♦♦♦♦ **PROS:** Easy setup; great pictures; cheaper than competing snapshot printers. **CONS:** Expensive supplies; prints photos only. **COMPANY:** Olympus (516/844-5000, www.olympus.com). **LIST PRICE:** $399.

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Alsoft PlusMaker

	PlusMaker	Manual Conversion
Effortlessly makes current Mac disks into HFS Plus disks without erasing and restoring from backups	YES	NO
Existing aliases and backup storage sets continue to work	YES	NO
Maximizes space savings with smallest possible allocation block size	YES	NO
Optimizes directory performance	YES	NO

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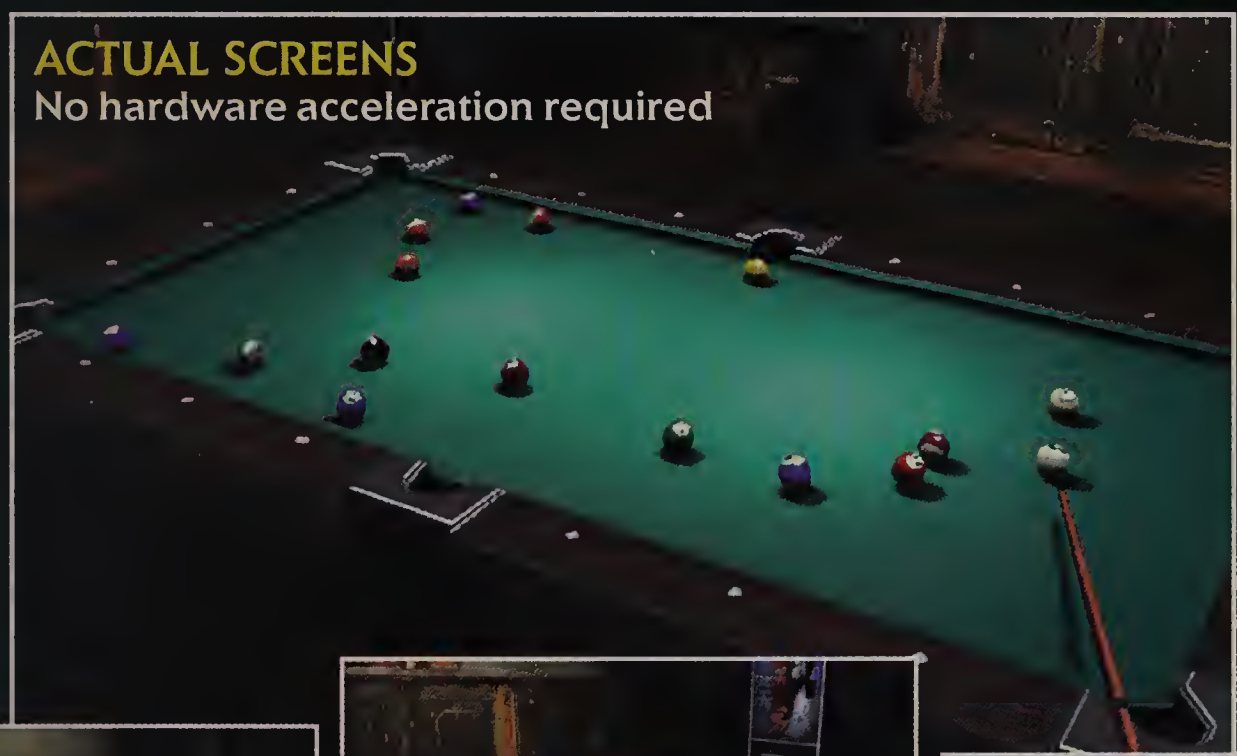

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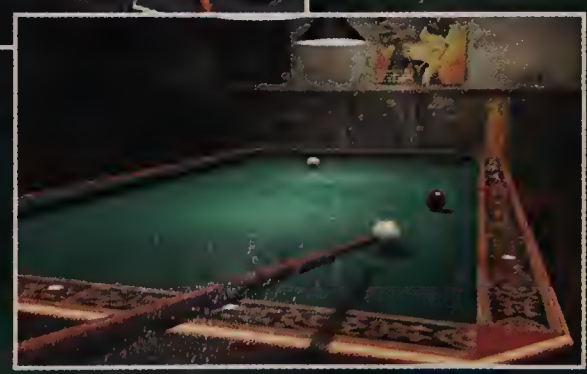

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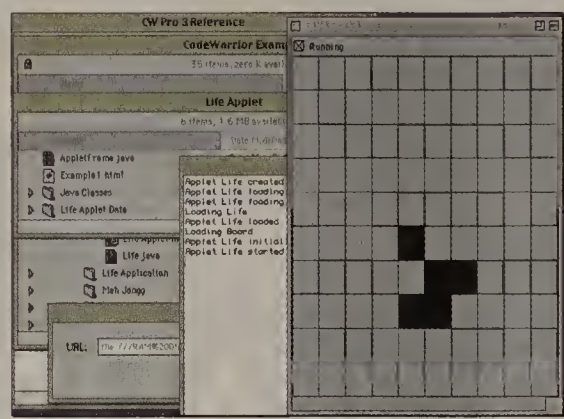
CodeWarrior Professional 3

HIGH-END CODE TOOLS PLAY UP JAVA

AS SUN MICROSYSTEMS AND Microsoft battle over language details, Mac programmers are watching Java's original promise—"write once, run anywhere"—degenerate into "write once, run screaming in frustration." Metrowerks' CodeWarrior Professional 3 eases cross-platform development in Java and C/C++ on the Mac, and includes Pascal tools for updating and recompiling Mac legacy code as well.

The biggest improvement to CodeWarrior Pro's integrated development environment (IDE) is that the debugger is no longer a separate module. With the debugging functions integrated into the development environment, you can set debug breakpoints and single-step through code directly in the editor. A more modest—and long-overdue—improvement is a folder-comparison utility similar to that in Bare Bones Software's BBEdit.

Programmers who use CodeWarrior to port Mac applications to Windows will appreciate the new features for games and graphics programs in the 80x86 tools: in-line assembly for the Intel MMX and AMD-3D instruction sets, and code optimization for the MMX, AMD-K6, and K6-3D instruction sets. Metrowerks has certainly tried to cover all the bases—this package even supports Microsoft's Visual SourceSafe 5.0 for version control. It also offers updated Java libraries and tools, the latest Swing interface-building components, and early versions of Java-to-native compilers for both Power Mac and Intel systems.



It's Alive This small Game of Life applet is part of CodeWarrior Professional 3's Java tutorial.

Although CodeWarrior still doesn't offer visual-programming tools for the rapid development of smaller projects, the integrated debugger—along with improvements in the Constructor and its associated libraries—cuts development time on large, frequently revised projects.

Of course, a product this size (it ships on three CD-ROMs) is bound to have a few rough spots; for example, looking at the release notes in the IDE editor converts the IDE menus to French. Fortunately, one of Metrowerks' strengths is the company's technical support and fast response to reports of beta bugs. The promise of little, if any, downtime due to compiler or library bugs helps explain CodeWarrior's following among the Mac code-writing faithful.

Macworld's Buying Advice CodeWarrior Professional 3 lets you work with everything from the oldest Mac code in Pascal to C++ apps for Windows to prerelease features in next year's version of Java. It's currently the best tool kit for Mac programmers doing serious development.—CHARLES SEITER

RATING: ♦♦♦♦½ **PROS:** Incorporates latest Java developments; best write-on-Mac, run-on-Windows tool set; great online support. **CONS:** No visual-programming tools. **COMPANY:** Metrowerks (512/873-4700, www.metrowerks.com). **LIST PRICE:** $449.

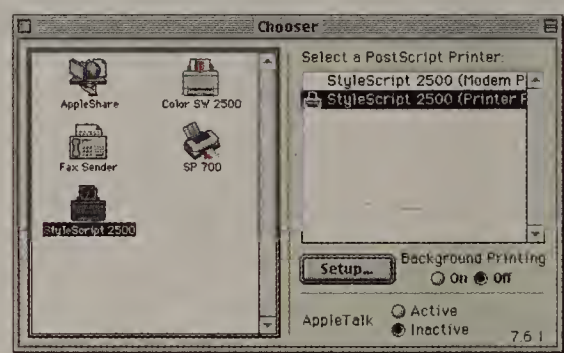
StyleScript 3.8

POSTSCRIPT INTERPRETER ADDS SUPPORT FOR NEW PRINTERS

THE LATEST INK-JET PRINTERS from Apple, Canon, Epson, and Hewlett-Packard do a great job of printing text and images, but they don't support Adobe's PostScript page-description language, the standard for professional graphics. Infowave's StyleScript bridges the gap, adding PostScript Level 2 capabilities to a select list of printers.

The latest update, StyleScript 3.8, includes support for HP's DeskJet 1120C; version 3.7 fixed minor bugs and added drivers for the Epson Stylus Color 600, 800, and 1520 printers. The software also works with Epson's Stylus Color 500; Canon's BJC 4550; HP's DeskWriter 550C, 600C, 660C, and 680C; HP's DeskJet 850C, 855C, and 870; and Apple's complete StyleWriter and Color StyleWriter lines.

All of these printers use Apple's QuickDraw software to build a printable image of your document. However, without PostScript—or an interpreter such as StyleScript—they can't accurately produce EPS files that you've imported into other programs. Printing to a PostScript-enabled printer is also useful for previewing output if you work frequently with service bureaus, where the equipment is PostScript-based.



Printing in Style StyleScript 3.8 installs a Chooser extension specific to your printer model.

To test StyleScript's capabilities, I printed a variety of QuarkXPress and Adobe PageMaker documents with imported EPS files. For comparison purposes, I printed the same EPS files directly from Macromedia FreeHand with the printer's native QuickDraw driver.

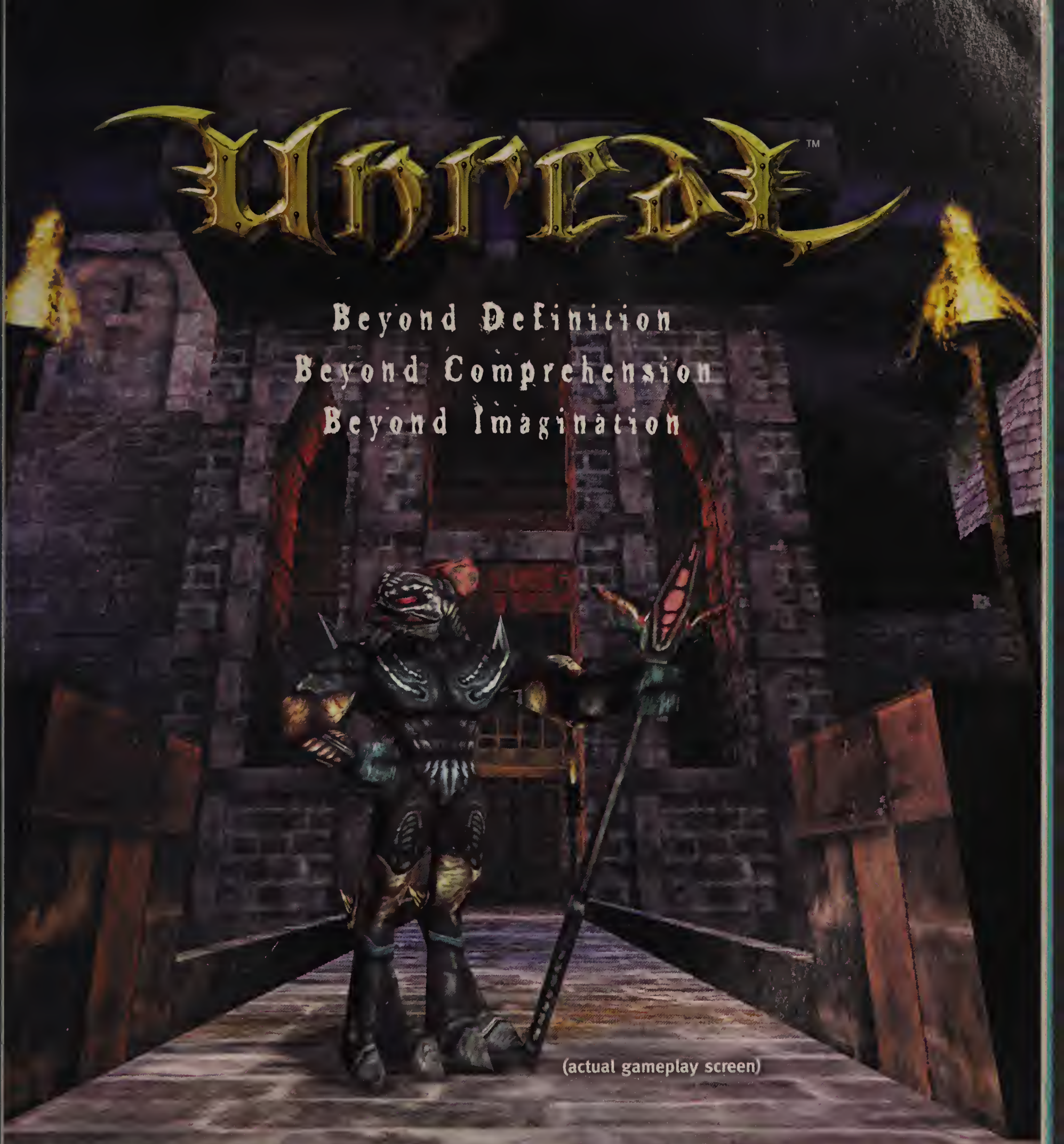
On a Performa 6400 with 72MB of RAM, each page printed in less than 5 minutes—not much longer than it took in QuickDraw mode. StyleScript uses the Mac's system memory to build the page, so the faster your Mac and the more RAM you have, the faster your output.

There are a few caveats, some pertaining to specific ink-jet models. StyleScript doesn't support the Photographic Quality Ink option on the StyleWriter 4500 and 6500, nor Apple's software printer-sharing features. It can print over Ethernet and LocalTalk networks, but it's not network-compatible with Epson and Canon printers and doesn't support EtherTalk-based printing to HP ink-jets. Because it includes its own color-balancing routines, StyleScript doesn't work well with ColorSync.

StyleScript 3.8 runs on 680X0 systems—those with a 68020 processor or better—and Power Macs; the newest Epson and HP drivers require a PowerPC.

Macworld's Buying Advice StyleScript 3.8 works as advertised. If you want to print EPS files from a supported printer—or want the comfort of knowing that your output more closely corresponds to your service bureau's results—StyleScript is well worth the $100 price. For an extra $20, you can get a package that also includes a serial-to-parallel cable for connecting an HP DeskJet 1120C to your Mac.—STEPHEN BEALE

RATING: ♦♦♦ **PROS:** Produces smooth-looking EPS files on inexpensive ink-jet printers. **CONS:** Doesn't support all printer features. **COMPANY:** Infowave (604/473-3600, www.infowave.net). **LIST PRICE:** $100.



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SPIGA 2.0

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USING A TERMINAL ADAPTER IS the cheapest way to get ISDN connectivity on a single computer, and Sagem's Planet ISDN GeoPort Adapter (SPIGA) has always been one of the fastest ISDN terminal adapters for the Macintosh. Because it connects to the Mac with synchronous—rather than asynchronous—signaling, the SPIGA is 25 percent faster than other serial-port ISDN devices, such as the 3Com Impact and Motorola's BitSurfr Pro.

One breakthrough feature in SPIGA 2.0 is in the upgraded Sagem PPP driver; PPP 2.0 offers Internet-connection sharing, a feature normally found only in ISDN routers or IP-gateway products costing twice as much. If you need to connect an entire LAN to the Internet on the cheap, SPIGA's Internet-connection sharing is a good way to go.

The SPIGA has always been simple to set up: just connect its brick-size pod to your Mac's nine-pin GeoPort socket, and install the easy-to-configure software. It now includes a special converter for Macs that aren't GeoPort-equipped. The new

MICHAEL FALCONER

version also comes with a CD that contains Apple's ISDN Telecom 3.1 suite, which includes a hands-free speakerphone, voice mail, and modem/fax software. Although the SPIGA lacks analog ports, the Telecom software gives you most of the features of an analog phone, fax, and modem, with such sophisticated features as an integrated address book, multiple voice-mail boxes, and voice/data-line sharing.

The bundled Internet-connection software supports Multilink PPP, which joins the two 64-Kbps ISDN channels to form a single 128-Kbps connection and dynamically adds bandwidth when data traffic demands it. The new Internet-connection–sharing feature acts as a router for your LAN, letting other users (on Macs as well as PCs) access the Internet via your Mac's ISDN link. And the router feature supports Network Address Translation, so you can share a single-user ISDN Internet account with any number of users. That feature normally requires either a full-fledged ISDN router or separate gateway software.

Thanks to its synchronous Mac serial-port signaling, the SPIGA's performance surpasses that of any other ISDN terminal adapter. File transfers that max out at 12K per second on competing products zip through the SPIGA at 15.5K. Internet-connection–sharing performance depends on the speed and workload of the routing Mac; in our tests, a Performa 6400/200 had no problem serving a half-dozen users at full speed.

Macworld's Buying Advice This upgrade to Sagem's Planet ISDN GeoPort Adapter adds some valuable features; the only clinker is the lack of analog ports. For SOHO users, this is one of the few products that actually deliver on much of the promise of ISDN.—MEL BECKMAN

RATING: ♦♦♦♦½ **PROS:** Internet-connection sharing; synchronous ISDN speeds; easy to set up; speakerphone and fax; low price. **CONS:** No analog ports. **COMPANY:** Sagem (408/446-8690, www.satusa.com). **LIST PRICE:** $395.

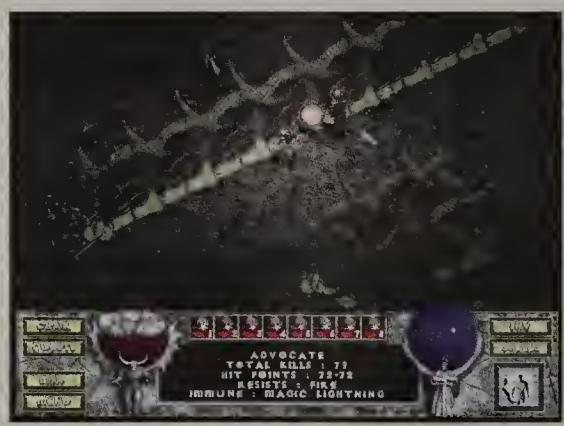
Diablo

A FRESH TAKE ON AN OLD TALE

SOME STORIES ARE SO WELL known that they're practically clichés. The sword-and-sorcery adventure has been around since *Beowulf*, for instance. But as Blizzard Entertainment proves with Diablo, it ain't the tale, it's how you tell it.

Diablo's settings are almost painfully stereotypical. You select an alter ego—warrior, sorcerer, or rogue—and then venture out to explore dungeons and slay monsters. Your base is a small village equipped with all the conveniences a hero could ask for: the blacksmith sells weapons and armor, a witch provides magical artifacts and rejuvenating potions, the healer cares for your wounds, and the town elder will—for a small fee—identify your wondrous plunder.

What's not typical is the attention to detail that Blizzard has lavished on Diablo. You watch the action in a three-quarter view similar to that of Bungie Software's Myth: The Fallen Lords (see "Great Games," January 1998), and although the graphics are slightly cartoonish, they're also breathtakingly lifelike. Skeletons lunge with sharp swords, demons breathe gouts of fire, and



Devil's Advocate They'd probably be completely lost in court, but these high-level minions are happy to bury you with fireballs and other nasty spells.

your own character changes appearance as you gain new weapons and armor.

Diablo's visuals are matched by a deliciously creepy soundtrack and sharp, realistic sound effects that provide usable cues. Even if you usually consider sound a frippery, it's worth plugging in a good set of earphones.

Diablo owes a huge debt to role-playing games like Dungeons and Dragons. Your character's numerical scores for strength, dexterity, vitality, and magic—and the equipment you carry—determine your abilities and immunities.

Despite its depth, Diablo's game play proves blessedly simple: just point and click. Although some key commands are worth memorizing, it's possible to operate the entire game successfully without ever touching the keyboard. Your information window updates dynamically as you adjust your inventory, so it's easy to experiment with different equipment setups.

Adventuring in the world of Diablo needn't be a lonely affair—you can hook up with your friends for cooperative or competitive play via modem or a LAN. But unlike some recent action games, Diablo is thoroughly enjoyable even when it's just you and your Mac. My only complaint is that I was able to finish Diablo too quickly. Almost before I knew it, I was planting my axe in the chest of the Lord of Darkness. On the other hand, Diablo generates a new labyrinth every time you start a new game, so it does offer replay potential.

Macworld's Buying Advice It's been a long time since I've been obsessed enough to actually finish a game, and although Diablo's tale isn't particularly original, it's a story that's perfectly crafted.—CAMERON CROTTY

RATING: ♦♦♦♦½ **PROS:** Gorgeous graphics; lush sound; an exciting retelling of an old favorite story. **CONS:** Ends too soon. **COMPANY:** Blizzard Entertainment (714/955-0283, www.blizzard.com). **LIST PRICE:** $49.95.

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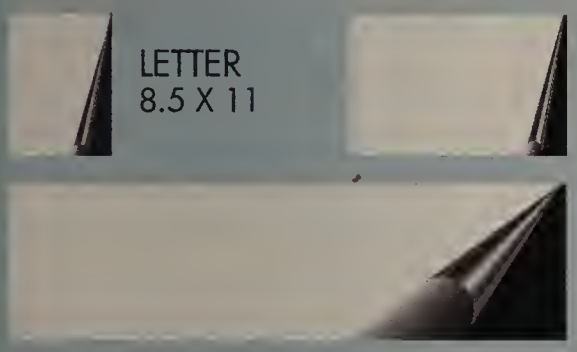

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APPLE'S OS STRATEGY

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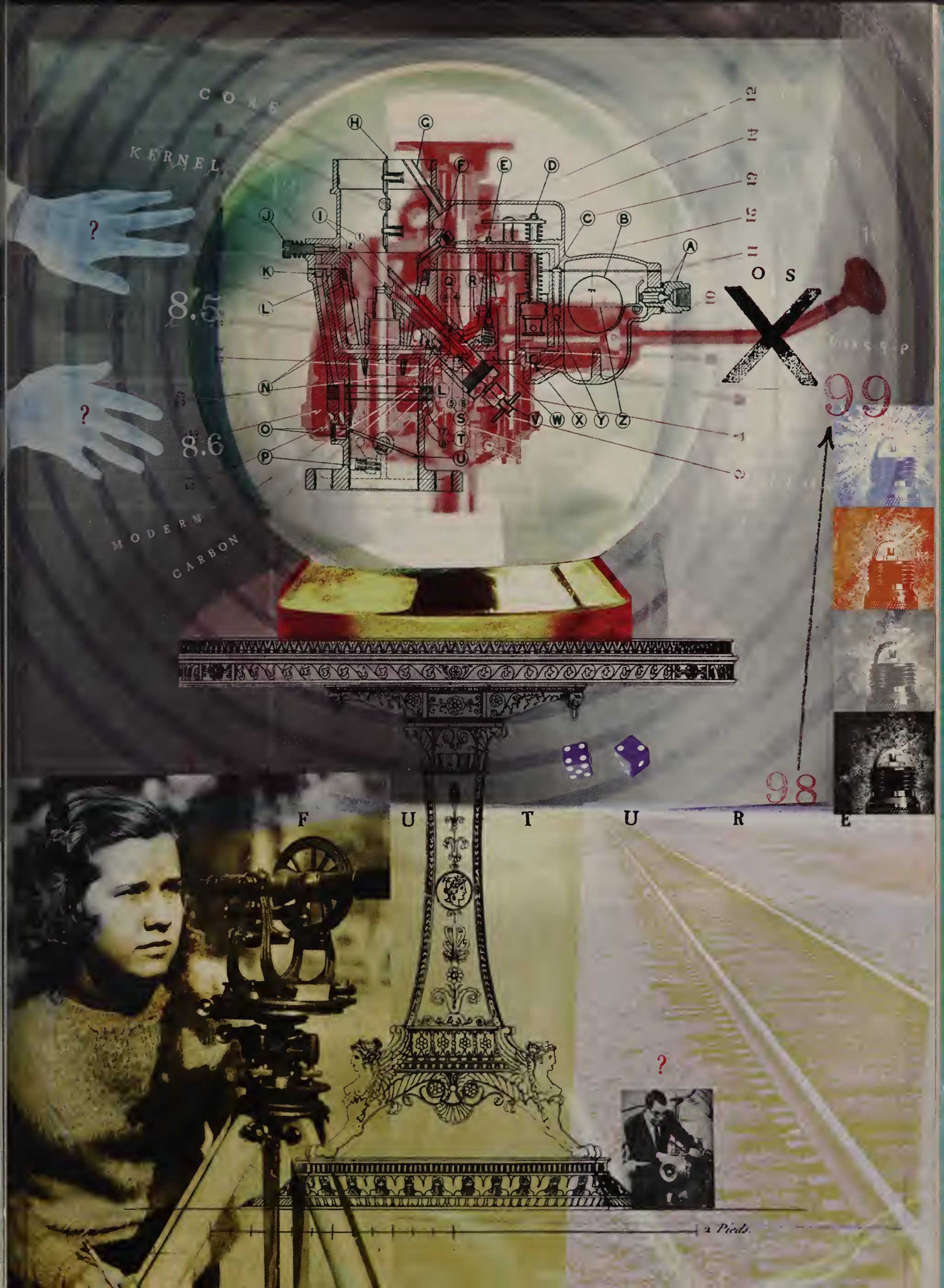
The X Factor

Apple Leads the Mac OS out of the Darkness

by Jeff Pittelkau

IT'S BEEN A DARK AGE FOR THE MAC. OVER THE PAST FEW YEARS, WHILE the Mac OS mostly remained the same, the forces of Microsoft moved forward with Windows 95, NT, and now 98. Mac users aren't satisfied with just keeping pace; we want to be out ahead. But instead we've been left waiting for a sign from Apple that it will remake the Mac for the twenty-first century. While we've waited for solid plans to move the Mac forward, Apple has cast about, desperately searching for some way to make dramatic speed and stability improvements to the Mac OS

STUART BRADFORD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without leaving behind all the people who use and write Mac software. Apple declared that first the Copland project and then Rhapsody was the light at the end of the tunnel, but each succumbed to failure (see the sidebar "The Mac's Midlife Crisis").

After all these years in the dark, searching for something to *replace* the Mac OS, Apple has finally created a clear strategy to bring the Mac OS itself back into the light. With this summer's release of Mac OS 8.5, Macintosh users will begin a journey that will lead to what they've been searching for: a version of the Mac OS that's a huge leap forward yet still runs all their favorite applications. With Mac OS X, the Mac OS's dark age is about to come to an end.

The Power of X

Due in the second half of 1999 (see the sidebar "A Mac OS Timeline"), Mac OS X—think roman numeral 10, not Mulder and Scully—is perhaps best described as the offspring of Mac OS 8 and Rhapsody.

From Rhapsody, the OS that Apple began to develop after it purchased Next (see "The Mac's Midlife Crisis"), Mac OS X will get stability and speed improvements that simply aren't possible with today's Mac OS. From the Mac OS itself, OS X will get both its look-and-feel and a level of compatibility with current and future Mac applications that Rhapsody doesn't offer.

A New Mac OS Don't let the name Mac OS X mislead you into thinking this is just another operating-system update. Mac OS X isn't like any version of the Mac OS that's come before. It's a *new* OS—but it provides a Mac interface and compatibility with Mac applications. Even calling it new is a little misleading—at its core, it's essentially Rhapsody with native Mac OS compatibility.

Like Rhapsody, Mac OS X will offer lots of "modern" OS features that can provide enormous speed and stability improvements—and that simply aren't possible in the current Mac OS. Those features include preemptive multitasking, protected memory, and a high-performance kernel (see the sidebar "What's Wrong with Today's OS?").

Although Rhapsody was billed as the future of the Mac OS after Apple bought Next, it has one major drawback: making current Mac OS applications run under Rhapsody would require a lot of rewriting. Most software companies are reluctant to rewrite their software, if not downright hostile to the idea.

Apple's solution to that problem was to combine Rhapsody's powerful features with an OS that has a strong tie to the Mac OS of old. That tie has been forged by something Apple calls Carbon—a collection of technologies for creating native applications for Mac OS X that will require only minor tune-ups, not the rewriting that Rhapsody would require.

The Ultracompatible OS

Carbon gets its name from the element upon which all life is based. All Mac OS X applications will be based on the Carbon specification, a cleaned up version of the Macintosh Toolbox that programmers use to create Mac applications.

Out with the Old The Mac OS we use today is a collection of more than 8,000 Toolbox functions—usually called application programming interfaces, or APIs—that developers use in their programs to do things such as open a file or create a window. These functions form the foundation on which all Mac applications, including the Finder, are based. Everything you do on your Mac is the direct result of program code that uses the Mac Toolbox.

As the Mac has evolved over time, so has the Mac Toolbox, with new functions added to the Toolbox for every new Apple technology. A lot of those functions, originally written in 680X0 code, were never updated when the Mac platform moved to the PowerPC processor, creating a performance bottleneck caused by slow, emulated instructions. Still other functions in the Toolbox were never designed to be used on a modern operating system like Mac OS X.

After Apple engineers identified all the parts of the Mac OS that were holding them back, they targeted those functions for demolition. The parts of the old Mac Toolbox left standing are the basis for the new, streamlined set of functions called Carbon.

In with the New According to Apple, most Mac programs will only need to be tweaked—not rewritten—in order to conform to Carbon and take advantage of all of Mac OS X's new stability and speed improvements.

Apple created a tool called the Carbon Dater, which developers can use to analyze which parts of their applications

A Mac OS Timeline

	1997				1998
	Winter	Spring	Summer	Fall	Winter
Mac OS	**Mac OS 7.6.1** Added stability improvements to Mac OS 7.6.		**Mac OS 8** Featured integrated Internet support, enhanced user experience, greater stability.		**Mac OS 8.1** Added HFS+ and improved Java support.
Rhapsody/OS X		**Rhapsody Preview Release** Ported NextStep to the PowerPC; no feature enhancements.	**Rhapsody DR1** Offered a more Mac-like interface on top of NextStep.		

APPLE KNEW IT HAD TO DO SOMETHING. THE COMPANY KNEW THAT the Mac OS, built layer by layer atop the foundation laid with the release of the original Mac back in 1984, was running out of room to grow. Part of the problem was the large amount of emulated 680X0 code still in the Mac OS, which acts as a bottleneck to performance. Another problem was simply that the early-eighties Mac OS foundation couldn't provide modern features, such as preemptive multitasking and memory protection, that users were starting to demand (and that Microsoft was threatening to provide).

Copland

So in the early nineties Apple set out on a quest to find a new operating system to replace the Mac OS. First came Copland, the operating system that was supposed to drastically alter both the look and the underpinnings of the Mac OS—and would cause a lot of compatibility problems. Copland was also supposed to pave the way for a revolutionary (and far-off) update called Gershwin, which would offer all the conveniences of a modern operating system.

The Copland project was continually plagued by delays, and Apple eventually killed it, operating under the assumption that Copland could never be finished. Some of the features of Copland, including an updated version of the Finder and a revamped Mac OS interface, have been rolled into both Mac OS 8 and 8.5.

The Next Step

After that problem-plagued project expired, Apple briefly considered Be's (www.be.com) BeOS, a still-under-development modern operating system. Instead, Apple bought Steve Jobs's company, Next, and its NextStep operating system.

Not only did buying Next bring Jobs back to Apple, but it also allowed Apple to create Rhapsody—a powerful OS based on NextStep. In Rhapsody, old Mac applications run in the Blue Box—basically an emulation of the old Mac OS. To take advantage of all the new OS's features, developers would have to rebuild their applications essentially from the ground up in the Yellow Box, the Next development environment.

And that's where Rhapsody stalled: key developers like Adobe Systems and Macromedia didn't want to spend several years developing applications for an untested operating system that almost nobody was using.

Instead, Mac developers wanted their current Macintosh applications to run in a modern OS environment without being wholly rewritten. That's just what Mac OS X is supposed to deliver.

aren't Carbon compliant or PowerPC native (all code in native Mac OS X apps must be PowerPC code). According to Apple, early results from this tool show that today's popular Mac applications are roughly 90 percent compliant with the Carbon specification.

At its Worldwide Developers Conference in May, Apple demonstrated prototypes of several popular applications that were "tuned up" for Carbon and were running on an extremely early version of Mac OS X: Adobe Photoshop, Apple's SimpleText, and the rebranded AppleWorks (formerly ClarisWorks). The Carbon-based version of Photoshop demonstrated at the conference was assembled in a couple of weeks, according to Apple and Adobe—which may indicate that the transition to Carbon may be surprisingly easy.

Other developers critical to the Macintosh platform, such as Microsoft and Macromedia, also went on record endorsing Carbon and Apple's new operating-system strategy—something that never really happened when Rhapsody was announced.

Just because many of our favorite Mac applications will probably be updated for OS X doesn't mean OS 8 will be left behind. Apple has said that Carbon-based apps *will* run on Mac OS 8, most likely with the help of a system extension that'll be installed when you install a Carbon-based application. (Although, obviously, Carbon-based apps running on Mac OS 8 won't offer the speed and stability benefits they will under Mac OS X.)

Old Favorites Rounding out Apple's new OS strategy is an attention not only to the future but to the past. Apple assures us that if you can run an application—say,

1999

Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Mac OS 8.5 See the accompanying article, "A First Look at Mac OS 8.5."		**Mac OS 8.6** Planned minor update to Mac OS 8.5.		**Sonata** Planned major update to Mac OS 8.6.	
Rhapsody DR2 Blue Box virtual machine emulates most of Mac OS 8 environment.	**Rhapsody 1.0** Complete Blue Box emulation environment for Mac OS 8 is a first step toward Mac OS X.		**Mac OS X Beta** Preview release for development and compatibility testing.		**Mac OS X** Release of modern Mac OS will run older Mac apps, new Carbon-based apps.	

Microsoft Word 5.1—in Mac OS 8, you'll still be able to run it in OS X. These non–Carbon-compliant programs won't be able to take advantage of Mac OS X's new features—but they *will* work.

You can run old Mac apps in Rhapsody, but you have to toggle between a screen showing the Rhapsody desktop and all its applications and one featuring old Mac applications—not exactly an elegant solution.

In contrast, Mac OS X promises to have one consistent user interface for all applications, so users won't have to think about what kind of program they're using. All the applications will simply run in Mac OS X.

There will be one big limitation to running older apps in this new OS, however. When an old Mac OS application running in OS X crashes, it'll take all the other currently running old Mac OS applications with it. Still, you won't have to restart your Mac or any Mac OS X–based programs.

New Possibilities Since Rhapsody was announced in early 1997, Apple has made a big deal about something called the Yellow Box—the standard method of developing applications for Rhapsody and, before that, Next's OpenStep.

The Yellow Box lets developers create applications much faster than they could using conventional means, and Yellow Box applications can run in Windows just as easily as in Rhapsody or Mac OS X. (Apps written for the Yellow Box won't work on Mac OS 8, however.)

Developers of tried-and-true Mac applications were hesitant to rewrite their applications for Rhapsody and the Yellow Box, but the advent of Mac OS X may make the Yellow Box a compelling place for developers to create brand-new applications.

While Carbon and Mac OS 8 compatibility will probably be the keys to Mac OS X's success, we wouldn't be surprised if the *next* generation of groundbreaking Mac applications spring from the Yellow Box.

X Marks the Spot

Even though Mac OS X is based on Rhapsody, don't think that all the things that make you love the Mac will soon be things of the past. Mac OS X will include just about every cool technology currently in the Mac OS, including the Finder, QuickTime, QuickDraw 3D, ColorSync, all the new additions that will be appearing in Mac OS 8.5 (see the accompanying article, "A First Look at Mac OS 8.5"), and many other technologies.

But it's possible that you may not be able to run Mac OS X on the Mac you use today. When Apple announced Mac OS X,

Tear Down This Wall In Rhapsody, the Mac OS and its applications are segregated from the rest of the operating system, appearing on a separate screen. In Mac OS X they'll behave like normal apps.

What's Wrong with Today's OS?

COPLAND. BE. RHAPSODY. WITH MAC OS X, APPLE'S YEARS-LONG search for a "modern" successor to the Mac OS finally appears to be over. But the roots of this quest may not make sense to most Mac users—after all, what's so bad about the Mac OS we know and love? Why has Apple spent years and millions of dollars trying to replace it?

Modern operating systems provide a computing experience that Mac users simply can't get: Systems almost never crash. User interfaces are always responsive, even when you've got several programs working in the background. Applications launch in a heartbeat. And most important, users can see and do several things at once.

Protected Memory

Perhaps the most overdue modern operating-system feature to come to the Mac in OS X is protected memory. In an operating system with protected memory, each application accesses only its own space in memory and doesn't touch the memory being used by other running applications or the OS itself.

Picture your Macintosh today. You're working in Photoshop, when all of a sudden everything grinds to a halt because your Web browser has crashed while trying to download a large file in the background. Even though Photoshop is not at fault, you are forced to reboot your Mac and pray that you saved your file recently.

In a system with protected memory, such as OS X, things are different. When an application crashes, it leaves all other applications up and running. In the early version of Mac OS X we saw in May, the dialog box to report a crashed application simply said, "The application has quit. You do not need to restart."

Preemptive Multitasking

With Mac OS X, Mac users will finally be able to take advantage of preemptive multitasking. While you've been able to run more than one application on your Mac since the days of the Switcher and MultiFinder, that's only been possible via a mechanism called *cooperative* multitasking.

Put simply, right now your applications cooperate with each other to share the power of your Mac's CPU. Each open application can use the CPU for as long as it wants, and all other applications wait patiently in limbo in the meantime. If you want to use QuickMail to download a large file from your mail server, all the other applications on your system have to wait in line while QuickMail does its business.

With preemptive multitasking, the operating system acts as supervisor, doling out access to the CPU. Every app gets a turn, but none get to pig out and take over the CPU completely. And some applications are more equal than others: the OS determines which goes first based on a complex system of priorities.

it described it as "targeted" at today's G3 Macs and all the future Macs. This doesn't necessarily mean that Power Macs based on the PowerPC 604 or 603 chips—or even older Power Macs upgraded with a G3 processor card—will be left behind during the transition to OS X, but Apple OS chief Avie Tevanian told *Macworld* that it's still an open question.

However, since all of Mac OS X will be written in the same high-level language used to write Rhapsody, it's just as portable as Rhapsody. While Apple says that it has no current plans to create a version of Mac OS X for Intel CPUs, it's technically possible. If Apple did decide to make the move to Intel in the future, Carbon could come along with it—meaning that it would require relatively little work for the developers of Carbon-based apps to make their programs work on Intel CPUs.

Getting There . . . Although the latest release of Rhapsody, DR2, doesn't *quite* look like the Mac OS, it's getting close. By the time Mac OS X arrives, the new operating system should be almost identical in appearance to the current Mac OS.

In the meantime, Apple still intends to ship Rhapsody 1.0 sometime this fall for both PowerPC and Intel processors—but it appears that version 1.0 may very well be the end of the line for that OS. Apple hasn't said whether it will continue developing a version of Rhapsody for Intel, although it has said that it will continue to develop the Yellow Box for Windows.

The Last Word

We've heard this story before: Apple comes up with a revolutionary new OS strategy that will make current Mac users happy, improve the OS without sacrificing compatibility, and put Windows in its place. As the old saying goes, fool me once, shame on you—fool me twice, shame on me.

But this time, Apple's story has the ring of truth—or at least plausibility—about it. With Mac OS X, Apple can balance modernizing the Mac OS with protecting developers' investments in current Mac applications. It's a strategy that worked for Apple once, during the transition from the 680X0 processor to the PowerPC, and it has the potential to be just as successful now.

All the elements are in place. The only question remaining is if Apple can deliver what it has promised for Mac OS X. If it can, the future of Apple—and the Macintosh—looks especially bright. **m**

JEFF PITTELKAU is *Macworld*'s lab director and operating-system aficionado. He's been waiting for an operating system like OS X for more than a year (see www.macuser.com/onlinecol/pittelkau.html).

The benefit to you is that you'll no longer have to stare at your screen while an application running in the background takes your computer's processing power away from you. It also means that you'll be able to do things like play QuickTime movies without dropping frames while you're reading your e-mail, editing an image in Photoshop, or even serving Web pages.

Virtual Memory

While the current Mac OS offers virtual memory, it's nothing like the modern virtual-memory system built into Mac OS X. If you've ever had a Mac application quit on you because it doesn't have enough RAM allocated to it, you know the joys of selecting an app in the Finder, choosing Get Info, and increasing its allocation.

With Mac OS X, that sort of trick is a thing of the past. You'll be able to launch your applications as you normally would, and Mac OS X will intelligently allocate as much virtual memory as those apps need to run. You won't even need to preconfigure how much hard-disk space to allocate for virtual memory—the operating system will do that itself, dynamically.

Multithreading and Multiprocessing

When a program is multithreaded, essentially that means it can walk and chew gum at the same time. For example, a fully threaded version of Photoshop could (theoretically) simultaneously operate a scanner to create a new image file and run filter calculations on one or several open images.

In Mac OS X, the Finder will be more fully threaded and will be preemptible, so you'll be able to do things like move a window containing a QuickTime movie while the movie continues to play. You'll also be able to pull down menus and move icons while other applications continue to update their windows.

This new OS will also support multiprocessing, or distributing a computing task across several CPUs. Right now the Mac OS supports multiprocessing only to a limited extent—applications like Photoshop must be written specifically to take advantage of extra processors.

But Mac OS X will be able to support multiprocessing at a system level. Different applications, individual threads within applications, and all threads pertaining to the OS itself could be sent off to different processors.

Mach Kernel

Like Rhapsody, Mac OS X uses the high-performance Mach kernel. The lowest-level component of a modern operating system, the kernel controls access to memory and hardware devices and performs all task scheduling.

Among the Mach kernel's features are very high-performance file input/output and networking. Mac OS X will inherit this high-performance foundation, one that's currently a part of Rhapsody.

A First Look at

Mac OS 8.5

It's Not OS X, but This Fall's Update to the Mac OS Is Nothing to Sneeze At

by Jeff Pittelkau

IT MAY NOT OFFER ALL THE BELLS AND WHISTLES OF MAC OS X, but Mac OS 8.5—Apple's next update to the current Mac OS, due to ship this fall—offers more than enough new features and improvements to keep Mac users busy until OS X arrives.

Apple can't promise that all of the features we mention will appear in the final version of OS 8.5 (if some of them aren't ready by the time OS 8.5 is due, they'll be saved for later), but it's a good bet that many of them will be on your Mac's desktop before the year's out.

The Look

A major release of the Mac OS wouldn't be complete without a bit of an interface makeover, and Mac OS 8.5 is no different. This update makes several changes to the Macintosh interface, fixing long-standing problems and setting the stage for the changes to come with Mac OS X (see the accompanying article, "The X Factor").

Grand Opening OS 8.5 will provide a new interface for navigating disks and networks from within applications, giving you much more power when you choose Open or Save from the File menu (see the sidebar "The New Face of Open and Save"). However, this new look will appear only when your applications have been updated to take advantage of it.

Appearances With OS 8.5, Apple will finally build into the system itself the ability to make overarching changes to the look of your Mac. This new feature was promised for Copland, and users of the shareware control panel Kaleidoscope (www.kaleidoscope.net) have also toyed with it for some time. It puts everything you've come to know and love up for grabs, including the menu bar's type, size, and color; and the look of windows, scroll bars, and icons. Even sounds and animations can be added to the interface.

Icons Grow Up You may not give them much thought, but icons are an essential part of your daily Mac experience. With OS 8.5, Apple is making the first steps toward taking Mac icons to a new level of visual sophistication. A new icon scheme will allow icon artists to be able to paint with a palette containing *millions* of colors (32-bit color) instead of the current 256. These new icons can also be antialiased, making icon edges less jagged and even partially transparent. And while current Mac icons are 32 pixels square, these new icons will be 48 pixels square, giving icon designers a bigger canvas in addition to the much-expanded palette.

At first these icons will be limited: they'll be able to appear in dialog boxes and as custom icons in the Finder, but not as standard application or document icons. Those file types will have to wait for future OS releases before they'll be able to get an icon upgrade of their own.

Super Scrolling The act of scrolling in the Mac OS is also about to see major changes. Apple will build "live scrolling" into the OS. With live scrolling enabled, your document will automatically scroll as you drag a window's scroll box up and down its scroll bar. (Some applications, such as Microsoft Internet Explorer and Bare Bones Software's BBEdit, do this already; in OS 8.5 all applications should have access to this feature.)

That scroll box will also change in OS 8.5. If you choose, you can have the scroll box (or "thumb") grow or shrink in proportion to the length of the document you're scrolling through, so that you can tell just what portion of the document you're seeing at any given time. This is an interface item that's been in Windows for a while and has been available for the Mac via shareware add-ons, but with OS 8.5 Apple has added it to the core OS.

Another user-selectable preference that was formerly a shareware-only proposition is the addition of double scrolling arrows on both sides of the scroll bar. When this option is selected, all your windows will have up and down arrows at both the top and

bottom. This can cut down on how much you have to move your mouse to navigate in a document.

Antialiased Text If you're tired of the jagged look of regular text, one new feature of OS 8.5 will knock your socks off: antialiased text. If you turn on this option, OS 8.5 will automatically smooth all the text on your screen using antialiasing similar to that found in Adobe's (www.adobe.com) Type Manager Deluxe 4.0. The result will likely be text that's easier to read, systemwide.

A New Organization

From consolidating control panels to improving the Find command, the improvements in Mac OS 8.5 should reduce the amount of time you have to spend spelunking in the depths of your computer or on the Net.

Control-Panel Consolidation Apple plans to unify control panels into logical new groups. For example, the Easy Open and PC Exchange control panels will blend into one, as will the Desktop Pictures and Appearance control panels. A new Internet control panel will provide a front end for all your Mac's Internet preferences via the Internet Config shared-preferences standard.

Application Expansion If you've ever double-clicked on an application that's already open (but with no currently open windows), you've noticed one of the Mac OS interface's shortcomings: sometimes it's hard to tell when you've switched into a different application. Two new features in Mac OS 8.5 should ease matters: First, you can optionally make the name of the application you're currently using appear next to its icon in the right-hand corner of the menu bar. Second, Apple plans to add a small floating application window to the Finder, à la shareware utilities such as DragThing (www.dragthing.com). This window will be able to display small or large icons (and optionally the name) of every currently running application. Clicking on an application's name or icon will automatically bring that app to the foreground.

Quite a Find Once touted as a feature of Copland, a vastly improved Find command has finally made it into the Mac OS with version 8.5. The new Find has a three-tabbed interface: in addition to a tab for the current Find File feature, there are tabs for Find By Content and Search Internet.

When you choose Find By Content, you can search for text found inside documents—unlike now, when you can search only for external characteristics of a document, such as a file's name or size. Results will be ranked in terms of relevancy, with the document most likely to be what you're looking for sorted to the top.

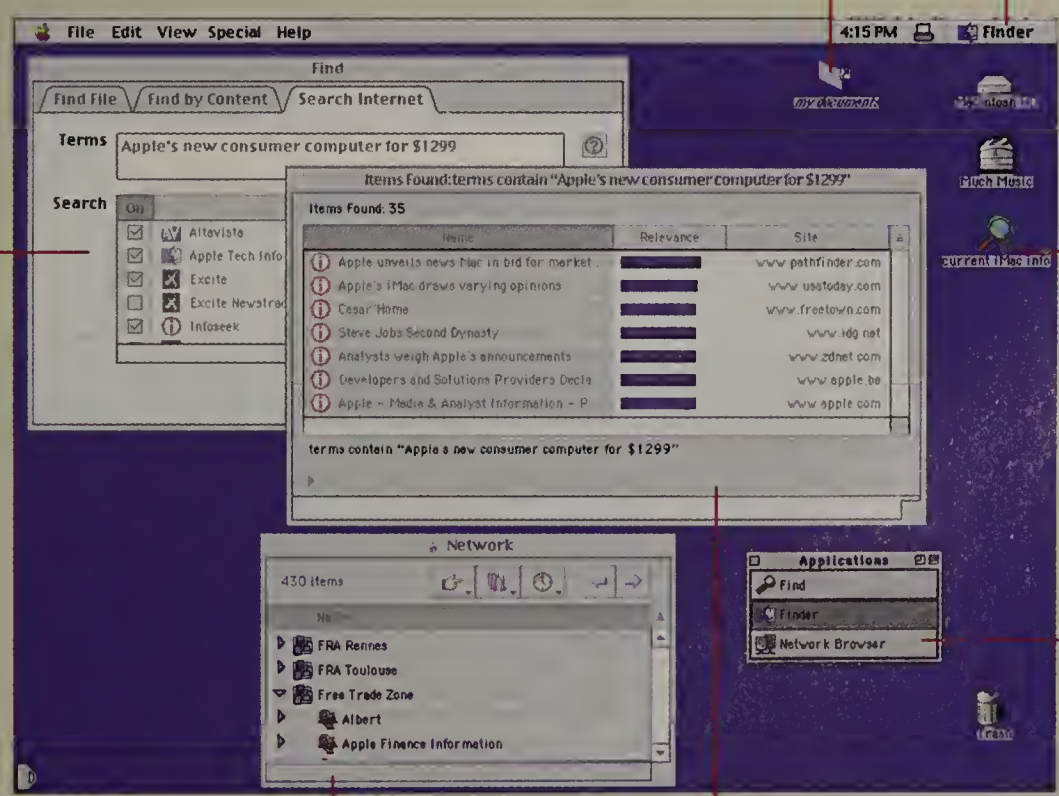
Choosing the Search Internet tab lets you search for documents on the Internet, without using a Web browser.

Mac OS 8.5 at a Glance

Alias Feedback
The names of aliases have always been italicized, but with OS 8.5, Apple has also overlaid a small icon on top of the alias's standard icon. It's a practice already used by Windows.

Application Feedback
Now your menu bar can optionally show the name of the application you're currently using, in addition to its icon. (The name automatically disappears if your menu bar fills up and needs that extra space.)

Find Times Three
With the updated Find command, you can search for a file based on its attributes or on the text it contains. You can also perform an Internet search (on several search engines simultaneously) from the Search Internet tab.



Saved Finds
If you find yourself performing the same searches repeatedly, you can save yourself some work: the latest version of Apple's Find utility lets you save your search queries and reuse them by double-clicking on the icon.

Application Dock
Here's a quick way to switch between applications: this optional floating window lists all currently running applications. Just clicking on an app brings it to the front.

Network Browser
Chooser begone! If you're just looking for a file server to mount, you can do it via the new Network Browser, which lets you scan your network and log in to remote servers from the desktop.

Net Search Results
Results of an Internet search come up in a search-results window. Double-clicking on a found item will open that page in your default Web browser.

Keychain Returns Perhaps the best feature of Apple's ill-fated PowerTalk software was the Keychain, a database that kept track of all your user IDs and passwords, so all you had to remember was the single Keychain password.

Now the Keychain's back. Apple's new Keychain will let you store all the log-in information for Web sites, FTP servers, and file servers, all in a portable Keychain file that's encrypted and password-protected. Once you've unlocked your Keychain, Keychain-aware applications will automatically be able to enter all the passwords you've collected. Once the Keychain's locked, that information is safely stored away again.

Network Navigation Although the Chooser's not dead yet, your need for it will be drastically reduced in OS 8.5. If all you want to do is find and log in to a file server over your local area network, you'll be able to do all that from the desktop. When you double-click on the Network Browser icon, you see a list of available servers on your network. Double-clicking on one will bring up a log-in screen (unless your Keychain is unlocked, in which case you'll automatically be logged in without having to type a thing).

Folder Actions AppleScript has had a huge impact on the way many Mac users work, saving them time and allowing them to tie different applications together in unique ways. If AppleScript mania hasn't hit you yet, just wait until OS 8.5 arrives.

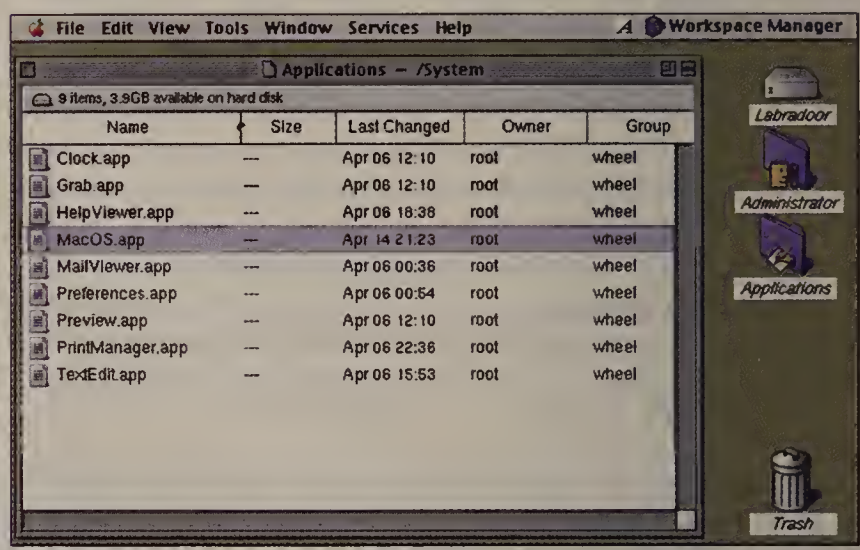
This version of the OS will offer Folder Actions, scripts that run automatically when something happens in the Finder. For example, you can set up a script to automatically upload a file to a Web server when you move it into a specified folder.

Improved Speed

Apple did more than just add features to make the Mac OS prettier and more useful. It also made this new Mac OS much faster.

File Copying Apple has made dramatic improvements to file copying on networks, with performance that's said to be on par with that of Windows NT. In one Apple demo, a G3 Power Mac was able to nearly max out the bandwidth of a 100Mbit Ethernet connection; the current version of the Mac OS can't come close to matching those network-transfer speeds.

More Native Code Best of all, Apple has converted even more of the Mac OS to PowerPC-native code, removing several major bottlenecks to performance. AppleScript, the scripting environment used heavily in automating media-publishing workflow on the Mac, has gone native in 8.5. The result: automated scripts can finish their work in a fraction of the time it used to take. And in what should be a major improvement, QuickDraw—the technology that draws everything you see on your Mac screen—has also sloughed off its old, emulated 680X0 code. With OS 8.5, items should draw on your screen much faster than they do today.



Merged Interfaces Bigger icons and the currently active application's name in the menu bar are two interface elements in Rhapsody that will come to the Mac OS in some form with version 8.5—steps on the path to the Mac OS X interface.

The Last Word

Sure, Mac OS X lurks on the horizon, promising a wonderful future for Macintosh users everywhere. But you don't have to wait around until late next year to give your Mac a major shot in the arm.

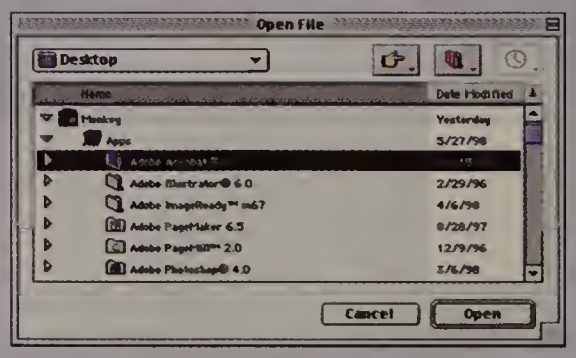
Mac OS 8 was a big breakthrough and a major first step for Apple, but the improvements that OS 8.5 promises should provide even more benefits to the Mac faithful. Apple may be focused on a future with Mac OS X, but that doesn't mean it's ignoring the Mac OS of the present. If the Mac's long-term future is bright, the short-term future is blinding. m

The New Face of Open and Save

TIRED OF THAT 1984-ERA BLACK-AND-WHITE box that pops up every time you hit ⌘-O? Then one major addition to OS 8.5 will be welcome news. The Standard File dialog box—the one you see every time you choose Open or Save As—is about to fade into memory.

Like the Chooser, the current Standard File dialog box has been around since the Mac started. Its replacement is Navigation Services, a much easier and more powerful interface. (Navigation Services doesn't replace Standard File—developers will have to update their applications before you'll see this new interface.)

From the Navigation Services dialog box, you can select several files at once. You can also mount and browse file servers from within Open and Save dialog boxes.



Open Sesame Apple's new Navigation Services window makes you realize just how old and dull the Mac's current Open and Save dialog boxes look.

Navigation Services will even remember your most recently accessed files and folders, as well as a list of "favorite" folders you can customize yourself, all from a series of buttons at the top of the Navigation Services dialog box.

Unlike their predecessors, these new Open and Save windows are nonmodal, movable, and resizable—meaning that you can now switch between applications while the window sits on your screen, move the window so you can see the contents of the document you're saving, and even stretch the window so that you're able to see more file information.

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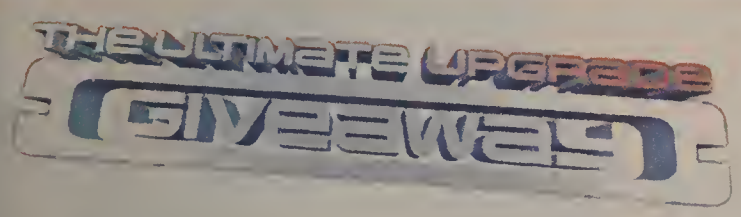

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But what about you folks who aren't going to Macworld Expo? We haven't forgotten you! During the three days of the show you can log onto **www.macworld.com** or any of the the participating vendors' web sites and register to win one of twelve complete sets of the high-performance hardware and software listed below. You can only register during the three days of the show. Good luck!

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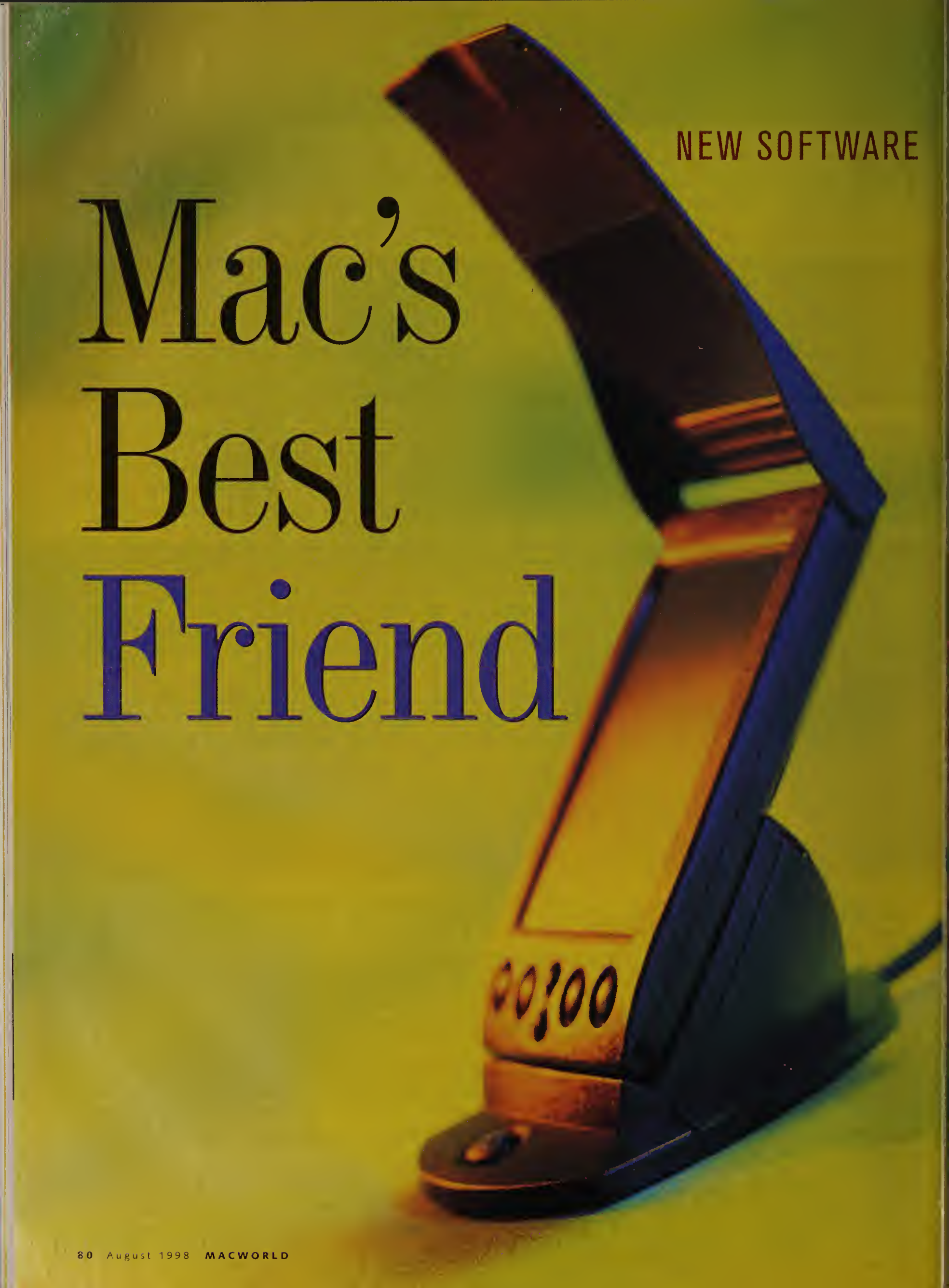


MAKES THE PALMPILOT YOUR MAC'S IDEAL COMPANION

It's easy to understand why 3Com's PalmPilot blasted past Apple's Newton to lock up 70 percent of the handheld-computer market in the PalmPilot's first two years: it's tiny, inexpensive, fast, and stingy with batteries, and it offers accurate handwriting recognition. Most of all, the PalmPilot succeeded because it didn't try to be a stand-alone PC. It was designed from square one to be an *extension* of your real computer, not a replacement for it. ❖ From the beginning, the PalmPilot came with a cradle that plugged into a serial port. With the push of a single button, the PalmPilot's connectivity software intelligently updated—in both directions—every kind of important data on both machines: your calendar, phone book, to-do list, Quicken data, e-mail, and so on. Who could ask for more? ❖ There was just one catch: to get the most out of this clever, elegant, and extremely Mac-like device, you had to use Windows. Mac users could use it, but just barely; most of the good stuff was available for the Wintel crowd alone. ❖ That situation's about to be turned on its head. Coming late this summer is some impressive new software that will make the Macintosh, now a second-class citizen, what it should have been all along: the premier platform for the PalmPilot. ❖ In case you're not yet a card-carrying member of the PalmPilot fan club, here's a brief overview: Made by 3Com's Palm Computing division (www.palm.com), the PalmPilot family is a series of small handheld computers, each measuring 4.7 inches tall, 3.1 inches wide, and 0.6 inches thick. Including the two AAA batteries that power it, a PalmPilot weighs less than six ounces—a far cry from the big, heavy (and now extinct) Newton MessagePad. ❖ As with the Newton, however, you control the PalmPilot by tapping and writing on its small LCD screen with a handheld stylus. On the PalmPilot, you write characters in Graffiti, a simplified alphabet designed for handheld devices. Once you get the hang of Graffiti, you can write on the PalmPilot with almost no errors.

SCOTT PETERSON

BY DAVID POGUE

Meet the PalmPilots

There are currently two models in the PalmPilot family. The newest is the $395 Palm III, which was released this spring (see the sidebar "PalmPilot: The Next Generation"). The older member of the family—offering less memory and lacking some of the Palm III's features—is the $295 PalmPilot Professional Edition.

The PalmPilot family's elegance, simplicity, engineering, and loyal following have always practically screamed "Welcome to Macintosh." Both machines run on Motorola processors. The PalmPilot's menus, buttons, and dialog boxes are clearly designed to look just like a Mac's. The PalmPilot's own software was written on Macs (using Metrowerks' CodeWarrior development tools). And yet since the first day of its existence, the PalmPilot and the Mac haven't really gotten along.

Lame Software First, Mac users had to pay an extra $15 just to get Mac-compatible software and cables, while the Windows connectivity kit was included for free. The Mac front-end software, Pilot Desktop 1.0, was Lame City: though it mimicked the PalmPilot's own calendar, phone-book, and to-do–list functions, its attempts were crude and limited. You couldn't make banners (to show weeklong trips on your calendar), dial numbers in the phone-book program, or even print out your calendar *as* a calendar (you could print appointments only as a text list).

And that was it—the Mac software was never updated again. In the meantime, 3Com constantly improved the Windows version of Pilot Desktop; it's now called Palm Desktop 3.0. The program offers numerous features unavailable on the Mac. Furthermore, the software you use to establish connections between your main computer and your PalmPilot, called HotSync, is much more reliable on Windows; as any Power Mac G3 owner can tell you, synchronizing requires a five-step workaround.

No Extensibility The crudeness of the Mac version of Pilot Desktop wouldn't be so bad if hungry third-party developers had been able to trump 3Com by providing powerful Mac-to-PalmPilot connections. But that never happened, because 3Com never provided a Mac *conduit*—PalmPilot-speak for a plug-in translator that connects Pilot data with data back on the host computer. On the other hand, dozens of Windows programs can take advantage of conduits to send data to and from the PalmPilot.

Without a standard conduit kit, only two Mac programs could talk to the PalmPilot: Now Up-to-Date and Now Contact, recently purchased by Qualcomm (www.eudora.com). The pro-

The Palm III is a lightweight compared to Apple's Newton: it's 4.7 inches tall and 3.1 inches wide and weighs 5.7 ounces.

PalmPilot: The Next Generation

BREAKING DOWN THE WALL that separated the Mac from the PalmPilot wasn't the only item on 3Com's agenda this year. Earlier this spring, the company released an impressive upgrade to the PalmPilot hardware itself: the Palm III.

If you're confused that there's now a PalmPilot that isn't called a *Pilot*, you're not alone. Thanks to pressure from the lawyers of the Pilot Pen company, the word *Pilot* is no longer a part of the handheld's name. (So, what are we supposed to call these gadgets? 3Com cheerfully proposes calling them "3Com connected organizers" or "Palm Computing platform devices." Yeah, right.)

Like its predecessors, the $395 Palm III is tiny and lightweight (5.7 ounces) and has a 160-pixel-square black-and-white touch-sensitive screen. But the case has been tapered to look and feel sleeker and smaller. A removable flip cover now protects the screen, and the 2MB of memory is enough to hold 20,000 names, calendar appointments, and other assorted information.

The Palm III also offers an infrared beaming feature that lets you transmit information to any other Palm III. Since the Palm III's infrared port is compliant with the IrDA standard, it probably won't be long before some enterprising programmer finds a way to let the Palm III exchange data through the air with infrared-savvy Macs.

But those major improvements should not eclipse all of 3Com's minor enhancements to the Palm III: The screen is clearer and has higher contrast than that of any previous PalmPilot model. The stylus now has a metal shaft to replace the flimsy plastic model. The Palm III's "Finder"—its Applications launcher—can now be viewed either by icon or as a list, and the programs can be put into different "folders" (categories).

Finally, all but one of the Palm III's built-in programs let you choose from among three typefaces. More important, the Palm OS can accommodate new fonts that you install yourself.

Perhaps best of all is 3Com's upgrade philosophy: you can upgrade any previous PalmPilot model to the Palm III for $130. The new memory card and memory-card door (which contains the infrared port) give you every feature of the Palm III except its sleeker shape and (for users of the original Pilot) the backlighting.

Get the Most from Your PalmPilot

SO THE PALMPILOT HAS FINALLY TAKEN ITS PLACE AS THE ULTIMATE HANDHELD COMPUTER for Mac users. But what's it good for? Sure, it's got a few built-in applications. Much more remarkable, however, is the world of add-ons that turns this marvel into a cult favorite. (You can find most of the software described here at www.palmpilotfiles.com.)

Pocket E-Mail

The Graffiti alphabet isn't ideal for composing long e-mails, but the PalmPilot is ideal for *reading* e-mail and for writing *short* responses. Thanks to the PalmPilot, downtime in planes, trains, and boring meetings can be productive.

There are two ways to retrieve e-mail: directly from the Net, or indirectly from your desktop computer. The direct method requires a modem, such as 3Com's $129 snap-on model. (With the $15 PalmPilot modem cable, you can also use any Hayes-compatible modem.)

For software, use SmartCode Software's $40 HandStamp, Actual Software's $30 MultiMail, or Ian Goldberg and Steve Gribble's free Top Gun Postman. Each can dial up your Internet account to send and receive mail.

You can also use the e-mail method long enjoyed by Windows users: just grab e-mail from the e-mail program running on your main computer. Upcoming software from Landware and Actual Software, for example, will synchronize your PalmPilot with Claris Emailer or Microsoft Outlook Express.

Web Piloting

Most people are stunned to learn that the PalmPilot can browse the Web, complete with graphics, bookmarks, and tappable hot links. (The PalmPilot's manual, advertising, and Web site don't say a word about this capability.) All you need is a PalmPilot Professional or Palm III (the original Pilots and the PalmPilot Personal can't handle the Web), a PalmPilot modem, and an Internet account.

By far the best PalmPilot browser is Proxinet's free ProxiWeb (formerly Top Gun Wingman). Since the PalmPilot's screen is monochrome (black-and-white), you might be surprised when ProxiWeb shows you Web pages in four-tone gray scale! It turns out that the PalmPilot's screen *is* gray-scale—the Palm OS simply doesn't take advantage of that feature.

Palm Sketchpad

There are plenty of graphics programs for the PalmPilot—but soon one of them will talk to the Mac. DaggerWare's $5 DinkyPad, the granddaddy of PalmPilot sketching programs, turns your PalmPilot into the world's most expensive sketch pad. It offers pen, circle, line, rectangle, and eraser tools in five different line thicknesses. DinkyPad is the first program to let graphics migrate to and from the Mac, making the program perfect for sketches, maps, and even handwriting when there's no time for Graffiti.

Palm Paperbacks

With the proper add-on, the PalmPilot can impersonate a pager, a flashlight, a universal remote control, or a phone dialer. But one of its most popular impressions has nothing to do with gadgetry: the PalmPilot can serve deftly as a *book*.

Thanks to tiny document-readers (there are lots of them, with names like Doc, AportisDoc, and TealDoc), you can load up your palmtop with text for reading en route (or en hotel room). The PalmPilot world is Doc-crazy. Web sites are filled with novels and poetry in Doc format (such as www.macduff.net, www.memoware.com, and www.pilotlibrary.org). Other sites generate downloadable news and region-specific weather reports (www.vu.union.edu/~cohenr/pilotnews, for example). One site, http://pilot.wiw.org, converts *other* Web sites into Doc format, so you can read, say, the latest MacWeek news on your train to work.

Using the free Mac program MakeDoc, you can turn any text file into a Doc document. You might especially consider doing so if you need to give a talk or demo: the auto-scrolling Prompter mode of Aportis's $30 AportisDoc makes the PalmPilot's four plastic buttons serve as Stop, Start, Faster, and Slower controls.

The Tiny Music Box

It's true that the PalmPilot's tiny speaker can play only one note at a time—Bach would have had to put four PalmPilots in a row to compose a fugue—but that doesn't mean the PalmPilot can't be musical.

For example, Eric Cheng's $10 PocketSynth is a terrific songwriter's tool that lets you record and play back single-line melodies. You specify the pitch by tapping on-screen piano keys and the rhythm by choosing from a row of note values. There's even a Tempo slider to control the playback speed.

As a bonus, the Metronome feature turns your PalmPilot into an outstanding visual and sonic electronic timekeeper. Add Tony Leung's free Tuning Fork, an electronic tuner for your instrument, and you've got a complete musician's tool kit in your shirt pocket.

Webbed Palms The World Wide Web? On a black-and-white palmtop? Right, thanks to the secret gray-scale feature of ProxiWeb. Tap on a graphic to view it at full size.

Pocket Packets The PalmPilot's built-in mail program has been worthless to Mac users—but new conduits will sync it up to Claris Emailer and Microsoft Outlook Express.

Portable Keyboard PocketSynth can actually record and play back single-line melodies.

grammers of that calendar/address-book combo had to hack 3Com's Mac software to work with their software. The result was a slow, RAM-hungry program called Now Synchronize, which is so buggy that it's been known to *delete* Date Book appointments in the process of synchronization.

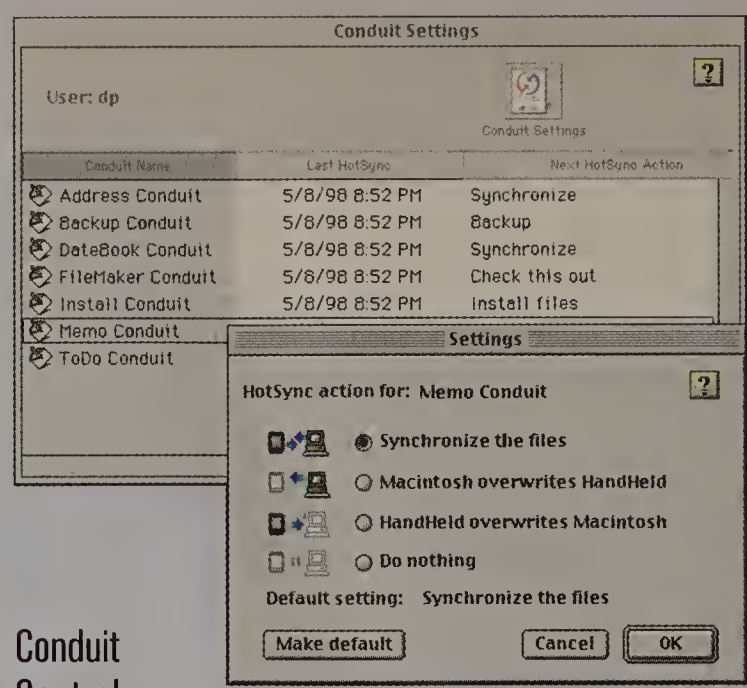
Détente Begins

But enough bellyaching about the past: thanks to 3Com's renewed commitment to the Mac, the cold war between the PalmPilot and the Macintosh has finally ended. And considering the void left after Apple killed the Newton, the timing couldn't be better.

Organizer Returns 3Com's first smart move was to put Pilot Desktop out of its misery forever. To take its place, 3Com pulled off one of the most ingenious win-win deals in recent software history: the company bought Claris Organizer, the fast, feature-rich address-book/date-book program that was orphaned when Apple folded Claris earlier this year. After a small makeover and the addition of PalmPilot connectivity, the new Palm Organizer will be the standard front-end software for Mac PalmPilot users.

The new software wasn't available at press time, but it's no secret that Claris Organizer is so polished, it makes Pilot Desktop (and even Palm Desktop for Windows) look like rough drafts. For once, it appears that *Windows* users will be looking longingly over the fence to see just how much greener the grass is. Organizer, for example, automatically formats phone numbers as you enter them; autocompletes repetitive information such as city names after you've typed a few letters; lets you drag and drop the names of people onto calendar appointments, and vice versa; and has hooks to Claris Emailer and ClarisWorks (now called AppleWorks), so you'll be able to generate letters and reports based on your PalmPilot data just as Windows users can.

Just the act of replacing Pilot Desktop with Palm Organizer would have been a coup for 3Com and a huge boon to Mac users. But when it came to integrating the PalmPilot with the Mac, 3Com didn't stop there.



Conduit Control

The new HotSync software lets you use conduits to other Mac software (such as FileMaker, in the list) in addition to standard PalmPilot software.

Full Diplomatic Relations

The former Claris Organizer is so good, you might not care whether you can use rival information-management programs instead. But 3Com's second big surprise is that now you'll really have Pilot-to-Mac software choices.

HotSync Reborn That's because this summer, 3Com will also release a brand-new, polished Mac version of HotSync as part of the $15 MacPac connection kit. (3Com says that current MacPac owners can upgrade to the new, much improved MacPac for free.) The new Mac HotSync

Making the PalmPilot Connection

3COM'S NEW MAC HOTSYNC SOFTWARE LETS SOFTWARE COMPANIES HOOK PalmPilot applications to Macintosh apps without a lot of hassle. Some of the early adopters whose products will become Mac-compatible this year are listed below.

Developer	Contact Information	This PalmPilot Program Will Connect . . .	. . . with This Mac Program	Comments
Actual Software	978/475-2690	MultiMail	Claris Emailer, Microsoft Outlook Express	MultiMail's Mac conduit is still in the planning stages.
Aportis	503/736-3240	BrainForest	BrainForest Pro	This popular outliner finally comes to the Mac.
Steve Dakin	www.wco.com/~sdakin/	QMate	Quicken	Widely used QMate finance program lets you track daily expenses and import directly into Quicken.
DataViz	203/268-0030	The built-in Memo Pad	Microsoft Word	The company is considering several products: one that would convert Word and Excel documents, and another that would HotSync e-mail.
Landware	201/261-7944	MicroMoney	Quicken	MicroMoney records your financial transactions. By late summer, the company will also sell an $80 portable keyboard for the Palm III.
		PalmPilot Mail	Claris Emailer	This product is still under discussion.
Shana	403/433-3690	Informed Filler	Informed Designer	Informed Filler collects form data on the PalmPilot; Informed Designer customizes and creates forms.
Stevens Creek Software	408/725-0424	Athlete's Diary	Athlete's Diary	This product is a tool for athletes in training.
Rob Tsuk	http://u1.netgate.net/~rtsuk/fmc/	Jfile	FileMaker Pro	Jfile gets FileMaker data onto your PalmPilot and back again.
WalletWare	949/262-9380	The built-in Expense program	Microsoft Excel, FileMaker, or Informed Manager	This Mac-only converter will be free or very cheap. It will also work with the company's upcoming Expense Plus for PalmPilot.

is a gorgeous, fully featured program that brings the Mac up to par with Windows, letting you install new PalmPilot programs via drag and drop, giving you complete control over your synchronization and backup options, and more.

What you'll see on your Mac is a program that looks like a cleaned-up version of the HotSync control panel that came before it. To install a new Mac-to-PalmPilot translator, all you'll need to do is drop the translator file into the Conduits folder. At least a dozen software companies have already said they're working on Mac-PalmPilot conduits (see the table, "Making the PalmPilot Connection").

Software Choices The program with the most connection potential is probably Eudora Planner, Qualcomm's integrated and redesigned follow-up to Now Contact and Now Up-to-Date. It's been designed for PalmPilot syncing from the very beginning—this time using the new 3Com conduit instead of the disastrous Now Synchronize. That's good news, because as good as Claris Organizer is, it isn't networkable or cross-platform and can't synchronize between a PowerBook and a desktop Mac—all of which Planner can accomplish.

And that's not the only connectivity activity going on. Actual Software (www.actualsoft.com) and DataViz (www.dataviz.com) are both developing programs to transfer your PalmPilot e-mail to and from Claris Emailer or Microsoft's Outlook Express. Landware (www.landware.com) and developer Steve Dakin (www.wco.com/~sdakin/) each make outstanding personal-finance programs for the PalmPilot—the $25 MicroMoney and $40 QMate, respectively—and will soon release conduit modules that will send this data straight to Quicken on your Mac, so you can scribble ATM transactions into the palmtop as you go about your day.

Got a FileMaker database you'd like to consult on your PalmPilot? No problem: get Rob Tsuk's (http://u1.netgate.net/~rtsuk/finc/) free conduit for John J. Lehtt's (www.land-j.com/pilprogs.html) $20 Jfile, the leading PalmPilot database program. And again, thanks to the new HotSync conduit kit, Mac users who turn in expense reports to their bosses after a trip no longer need to stoically ignore the PalmPilot's built-in Expense program. Both Shana (www.shana.com) and WalletWare (www.walletware.com) have Mac conduits in the works that will send the PalmPilot's Expense data to ready-to-print Informed Designer, Microsoft Excel, or FileMaker templates.

Palm III at a Glance

New Frontiers But the popular Mac standbys (Excel, FileMaker, Quicken, and so on) aren't the only programs whose data you'll be able to sock in your pocket. The HotSync conduit makes possible new programs you haven't seen before on the Mac, such as the $40 BrainForest Pro. More will come—you can count on it, thanks to the thousands of "road coders" (independent PalmPilot programmers) who have helped create the 3,000 programs available for the device (see the sidebar "Get the Most from Your PalmPilot").

In short, the two software announcements by 3Com—about a Claris Organizer–based front end for the Mac and a HotSync conduit kit—will make the PalmPilot/Mac combination a more powerful, flexible, natural combination than any palmtop/PC combination on earth, and this will be a 180-degree turnaround from the previous sad state of affairs in PalmPilot-Mac relations.

The Last Word

At long last, the floodgates of Mac-to-PalmPilot connectivity have opened. In the coming months, software modules will appear that can transfer a wide variety of data to and from the PalmPilot.

After two years of frustration, Mac users who took the PalmPilot plunge will make the move from some of the worst Mac software around to some of the best. Instead of carrying a palmtop in our pockets whose potential was only half recognized, we're finally learning what 3Com had in *its* back pocket—and it's all good news. **m**

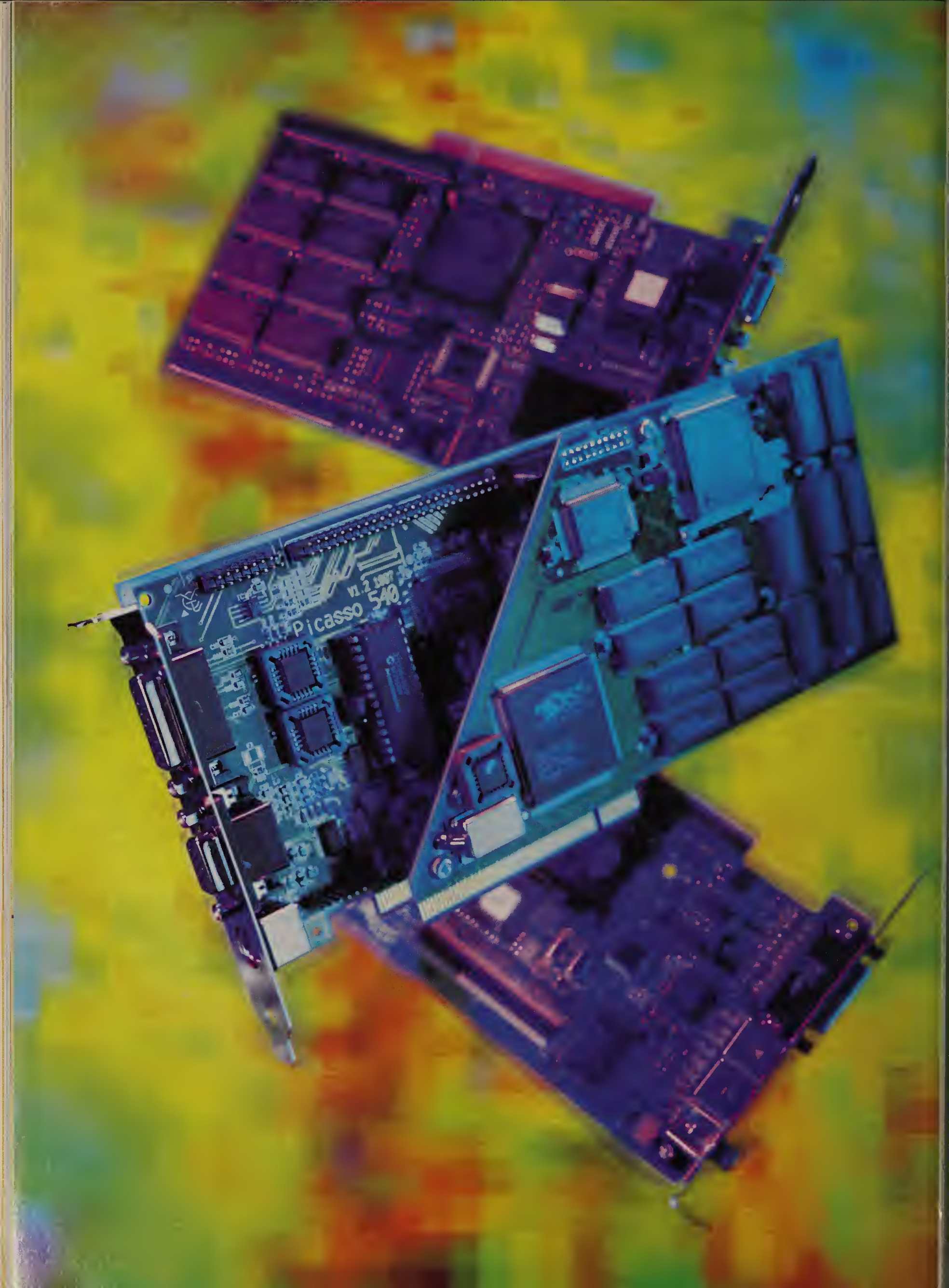
Contributing Editor DAVID POGUE is the author of *PalmPilot: The Ultimate Guide* (O'Reilly & Associates, 1998).

Bookmarks

PilotGear HQ One of the first and largest Pilot-only shopping sites, featuring commercial software and shareware
www.pilotgear.com

Ray's PalmPilot Software Archive
Solid library, including continuously updated lists of recently released software
www.palmpilotfiles.com

The Pilot Mailing List E-mail about every conceivable aspect of Piloting
www.ultraviolet.org/mail-archives/pilot-mail.html


Picasso 540

Macworld LAB TEST

Quick on the Draw

by Stephen Beale

KEEP THE PIXELS FLOWING WITH THESE 2-D AND 3-D GRAPHICS ACCELERATORS

SCROLLING A BIG PHOTOSHOP IMAGE, manipulating 3-D models, navigating virtual worlds in your favorite computer game: all place a heavy burden on a Mac's CPU. Fortunately, your Mac doesn't have to bear this load by itself. Add a suitably powerful graphics accelerator, and bandwidth-chewing models and images become putty in your hands.

A graphics accelerator is a PCI card that replaces the on-board video or video card in your Mac. Most perform multiple functions: they speed up screen redraws, increase the resolution and number of colors your monitor can display, and often accelerate QuickTime movies and 3-D graphics operations. The cards work with almost any multisynchronous monitor, although their high-resolution display capabilities are best suited to larger monitors.

Macworld Lab evaluated six PCI-based graphics accelerators for the Mac: the $280 Xclaim 3D, $400 Xclaim VR, and $600 Nexus GA, from ATI Technologies (www.atitech.com); the $700 ix3D Ultimate Rez, from iXMicro (www.ixmicro.com); the $895 Vision 3D Pro II 250, from Mactell (www.mactell.com); and the $550 Mac Picasso 540 + 3D Overdrive, from VillageTronic (www.villagetronic.com). (Matrox declined to submit its graphics accelerator for testing.)

We tested each card on two systems: a 266MHz Power Macintosh G3 and a 200MHz Power Macintosh 7300. (We also used the cards with a 180MHz Umax C500; however, the ix3D Ultimate Rez was too big to fit in the C500's PCI slot, and the 3-D module of the Mac Picasso 540 barely fit.) To

KEVIN CANDLAND

Graphics Accelerators Compared

Company	Product	Mouse Rating	List Price	Phone	Max. 24-Bit Resolution (in pixels)	Max. 24-Bit 3-D Window (in pixels)
ATI Technologies	Nexus GA	♦♦♦½	$600	905/882-2600	1,920 × 1,080	1,024 × 768
	EDITORS' CHOICE Xclaim 3D	♦♦♦♦	$280	905/882-2600	1,600 × 1,200	1,024 × 768
	EDITORS' CHOICE Xclaim VR	♦♦♦♦	$400	905/882-2600	1,600 × 1,200	1,024 × 768
iXMicro	ix3D Ultimate Rez	♦♦½	$700	408/369-8282	1,920 × 1,080	1,152 × 870
Mactell	Vision 3D Pro II 250	♦♦♦½	$895	512/323-6000	1,920 × 1,080	1,152 × 870
VillageTronic	Mac Picasso 540 + 3D Overdrive	♦♦♦	$550	610/586-5701	1,152 × 870	1,152 × 870

Playing Games: Glide versus RAVE

MACWORLD GAMES GURU CAMERON CROTTY TESTED ALL SIX graphics accelerators with two quite different games: MacSoft's first-person shooter, Quake, and Bungie Software's third-person battlefield simulator, Myth: The Fallen Lords. Both games include extensive 3-D imagery that must be rendered on the fly. Without acceleration, action becomes jerky and textures are rendered at a low quality.

Each game offers two options for 3-D acceleration: Apple's QuickDraw 3D Rendering Acceleration Virtual Engine (RAVE) technology and 3Dfx's Glide. The latter technology, popular in the PC market, is designed specifically to boost game performance. Thus it offers a better gaming experience—faster, smoother movement and higher-quality textures—than RAVE. Because Glide is based on the 3Dfx Voodoo chip set, it works only with boards that include the 3Dfx chip.

Mac users can choose from two boards with 3Dfx chips: VillageTronic's $550 Mac Picasso 540 + 3D Overdrive and TechWorks' (512/794-8533, www.techworks.com) $250 Power3D. The Power3D isn't in our roundup because it won't accelerate graphics apps; you'd still need a separate video card, or the Mac's built-in video, to drive a monitor. But when running games in Glide mode, it offered better performance and image quality than any of the six graphics accelerators in RAVE mode.

When running either game in Glide mode, the Mac Picasso 540 + 3D Overdrive offered crisp acceleration and great-looking textures. However, when running Myth in Glide mode, the card displayed a thin line of artifacts at the bottom of the screen. Distortions were more evident when we ran Quake in RAVE mode: walls warped, objects shifted, and textures bled together. The performance of ATI's Xclaim VR, running in RAVE mode, approached that of the Power3D in Glide mode. Textures were muted, however, and the lack of antialiasing caused noticeable jagged edges. The Nexus GA also performed well, but when running Quake, it produced some inappropriate fogging: close-up textures were blurry, while distant surfaces were clear.

Mactell's Vision 3D Pro II 250 card produced mixed results, outperforming its competitors in one timing test but falling to the back of the pack in another. iXMicro's ix3D Ultimate Rez card produced no appreciable 3-D acceleration in our tests.

The bottom line? Among RAVE accelerators, the ATI cards offer the best performance, but the Mac Picasso card benefits from its use of the 3Dfx Voodoo chip and Glide API in addition to RAVE. Both cards also give you the other advantages of graphics accelerators, such as faster 2-D display in all Mac applications and smoother 3-D modeling in programs that support RAVE. If your 3-D interests are limited to game-playing, save yourself some money and get the TechWorks card.

Before . . . Without 3Dfx hardware acceleration, this scene from Myth: The Fallen Lords lacks fluidity of movement. Because visual detail is decreased, the water texture looks rougher; the stone texture, blockier; and the terrain, patchier. Without hardware-based transparency, the shadows have hard edges.

. . . and After With 3Dfx hardware acceleration, texture filtering results in subtler, less banded shades of blue in the water's surface; hardware-based transparency lends softer, more realistic shadows. The terrain and the stone-textured walls of the bridge are almost too smooth, however.

get a feel for how the cards handle interactive rendering tasks, we timed common 2-D and 3-D graphics operations and performed side-by-side comparisons. We also played the latest 3-D computer games, using each of the tested cards; the results are detailed in the sidebar "Playing Games: Glide versus RAVE."

Under the Hood

Graphics accelerators get their muscle from specialized chips designed to accelerate 2-D and/or 3-D operations. ATI's Xclaim 3D, Xclaim VR, and Nexus GA all use the company's Rage Pro, a single 64-bit chip that offers both 2-D and 3-D acceleration.

The Mac Picasso 540 + 3D Overdrive is actually two PCI cards bolted together. The 3D Overdrive module, which connects directly to the Mac Picasso 540 and requires an adjacent PCI slot, boosts 3-D graphics performance with a 3Dfx Voodoo chip set; these chips are popular in PC-based graphics accelerators but are found in only one other Mac board, TechWorks' Power3D (see the sidebar "Playing Games: Glide versus RAVE").

Mactell's Vision 3D Pro II 250, actually manufactured by Formac, features a 128-bit Imagine III graphics processor from Number Nine. The ix3D board uses iXMicro's 128-bit TwinTurbo graphics chip.

Along with specialized chips, all the boards include video memory, generally 4MB or 8MB. (We tested each card with 8MB.) The amount of memory determines the card's maximum resolution and *color depth*, the number of colors that can be displayed on the screen—either thousands (16-bit color depth) or millions (24-bit).

Some of the boards offer extra goodies. ATI's Xclaim VR, for example, includes a video-in port that lets you capture video frames from a VCR, and a video-out port that lets you record to a VCR or output to a TV set. ATI's $100 Xclaim TV adds a TV tuner to the Xclaim VR (see the sidebar "The Mac Tunes In: TV on Your Desktop").

2-D Acceleration

Driving a high-resolution display means pumping millions of pixels to your screen each second. Without some form of 2-D acceleration, the pixels can slow to a crawl, resulting in sluggish screen redraws.

To evaluate each card's 2-D acceleration, Macworld Lab timed four tasks: scrolling in Microsoft Word 98, Adobe Photoshop 4.0.1, and QuarkXPress 4.0.1 and playing back video in Puffin Designs' Commotion 1.1 (see the benchmarks, "Faster than a Speeding Pixel?"). We also ran the MacBench Hi-Res Publishing Graphics test, which evaluates the performance of common graphics tasks.

The clear winner was Mactell's Vision3D Pro II 250. iXMicro's ix3D Ultimate Rez offered the second-fastest acceleration but exhibited some unfortunate quirks: text sometimes appeared squashed in Finder windows, and the background pattern shifted when we changed bit depths. The ATI and VillageTronic boards, while not quite up to the speed of their competitors, both did a respectable job of accelerating 2-D display. ATI's Nexus GA, however, is the only card in the roundup that doesn't offer QuickTime acceleration.

3-D Acceleration

All six cards in our roundup support Apple's QuickDraw 3D Rendering Acceleration Virtual Engine (RAVE). Modeling software that supports RAVE can transfer rendering operations from your Mac's CPU to the 3-D chip on the card, speeding them considerably. The best-performing cards in our roundup let you manipulate reasonably complex 3-D models, even textured models, smoothly in real time. The 3-D acceleration also comes in handy when you're playing popular RAVE-compliant computer games. (Note that these cards are designed to expedite only the interactive stage of 3-D creation; they won't accelerate final-rendering schemes, such as Phong and ray-tracing.)

To test 3-D acceleration, we manipulated models at two resolutions (1,024 by 768 pixels and 800 by 600 pixels), each at 16- and 24-bit color, in several programs that support QuickDraw 3D. We also tested the cards' respective frame rates in LightWork Design's Walker 1.1, software that renders 3-D scenes on the fly.

ATI's Xclaim VR, Xclaim 3D, and Nexus GA cards were the fastest in our testing. ATI's control panel lets you compress textures to improve performance, but that can result in color banding due to lower bit depths.

Mactell's Vision3D Pro II 250 handles textures well and allows for smooth movement of 3-D models. At a resolution of 1,152 by 870 pixels, however, the card offers 3-D acceleration only when showing thousands of colors. The company plans to release optional 8MB and 16MB memory modules that will allow acceleration at higher-resolution, 24-bit display.

VillageTronic's Mac Picasso 540 + 3D Overdrive—which also supports Glide, a computer-game API tied to the 3Dfx Voodoo chip—offered good 3-D acceleration. When running games that conform to the Glide API, it outperformed even the ATI cards, which support games only in the slower RAVE mode. It displayed some texture banding and minor artifacts, however, such as a subtle lagging effect when we moved models. The biggest downside is that it requires two PCI slots; another negative is its poorly written documentation.

We were least impressed by iXMicro's ix3D Ultimate Rez, which offers high-quality texturing at the expense of 3-D performance. The card produced no 3-D acceleration in 16-bit display mode and only mediocre acceleration in 24-bit mode. Worse, it doesn't support transparency for more-realistic rendering. Although the software gives you a variety of texture-quality and buffering options, they don't compensate for weaknesses in the hardware.

Across the Board ATI's graphics cards include a control panel that gives you access to accelerator settings. You can choose display resolution and other settings by clicking on different parts of the circuit board.

Looking Forward

These boards may boost your Mac's graphics performance, but there's always room for improvement. Many vendors see promise in OpenGL, a 3-D graphics API that Silicon Graphics developed for its Unix worksta-

The Mac Tunes In: TV on Your Desktop

LIFE IS FULL OF TOUGH CHOICES: Surf the Net or watch *Star Trek*? Retouch a Photoshop image or check out *Monday Night Football*?

If you add a TV tuner to your Mac, you don't have to choose. For as little as $100, you can watch your favorite TV shows and videos from the comfort of your Mac's desktop. Because the TV runs in a resizable window, you can watch the action while working in other programs. You can even capture video frames and save them as still images or QuickTime movies.

Macworld evaluated three cable-ready, 125-channel TV tuners. ATI Technologies' $100 Xclaim TV (♦♦♦♦) is an external hardware unit that connects to the video-in port of AV-ready Apple G3's or the Xclaim graphics accelerator. iXMicro's $120 TurboTV (♦♦♦) is a PCI card that works with your Mac's existing video. Micro Conversions' (817/468-9922, www.microconversions.com) Video Wizard (♦♦♦)—$250 for a 2MB version, or $270 for 4MB—is a PCI-based 2-D graphics accelerator with an integrated TV tuner. All three require a Power Macintosh.

Virtual Remote The TV tuners we tested (ATI's is shown here) present you with an on-screen remote control for switching channels and choosing other options.

Display Capabilities

By default, all three tuners display video in a 320-by-240-pixel window, but you can make the window larger or smaller. For larger windows, the tuner software generally interpolates from the default size. The interpolation appears to work well: even at 640 by 480 pixels, video quality is comparable to what you'd get from a decent TV set.

We did encounter anomalies with the Video Wizard and TurboTV boards. When we chose 640-by-480-pixel display in the Video Wizard, the video played at considerably less than 30 frames per second; rather than interpolating, the software runs the video at the full 640-by-480-pixel resolution for greater detail. However, if you choose 320-by-240-pixel resolution and then run the video full-screen, the software interpolates the display and the video proceeds at its normal frame rate.

The TurboTV card generated some serious interference when the video window was set to 640 by 480 pixels and the monitor set to millions of colors. iXMicro says it optimized the card to support video display at thousands of colors rather than millions. When we switched to thousands of colors, the distortion disappeared.

Input and Output

All three tuners include terminals for connecting a TV antenna or cable, along with inputs for S-Video (for connecting camcorders) and composite video (for connecting VCRs). The Xclaim TV card also features RCA jacks for stereo audio from the VCR, plus an S-Video port for connecting to the Xclaim VR card. The Video Wizard, which doubles as a graphics adapter, includes a DB-15 connector for Mac monitors.

The Video Wizard also features a video-out port that lets you display video on a TV screen or record it to a VCR. Neither the TurboTV nor the Xclaim TV includes video-out capability, but it's not needed in the latter because ATI lets you export video with Xclaim VR.

Sound

One of the trickiest aspects of using these cards is getting sound into your Mac. The Xclaim TV uses the simplest approach—you just connect a mini stereo plug from the tuner to your Mac's microphone jack. You can still use the microphone, thanks to a pass-through connection.

TurboTV gives you two choices: plug it into the microphone jack, or use internal cables to connect the card to an audio socket on your Mac's motherboard. Plugging into the microphone jack precludes use of the microphone; the alternative requires some tinkering and won't work with a Performa 6300 or 6400 or a Power Mac 6500.

Tinkering under the hood is your only option with the Video Wizard, which lacks an audio-out jack. Instead, Micro Conversions provides cables that should work with most Power Macs.

Software

All three tuners include software that lets you use an on-screen remote control to switch channels, adjust picture quality, and record video (see the screen shot, "Virtual Remote"). It's the extra features that separate the three, and here ATI is the hands-down winner.

ATI's Xclaim Video Player software lets you view and save closed-captioned text, essentially providing a written transcript of a TV show. You can even ask to be notified when certain "hot words" show up in the closed captions, and you can tell the software to save a transcript automatically when it encounters a hot word. Also useful is the ability to name each channel; once you've done that, you can quickly choose among TV stations and cable networks from an alphabetical list.

The TurboTV software offers basic channel-switching and video-capture functions but little else. A forthcoming release will add closed-captioned–text capture but will still lack ATI's hot-word–notification feature. The Video Wizard software has the slickest interface of the three, but it lacks closed-captioning features and makes switching window sizes a clumsy process.

Macworld's Buying Advice

Of the three tuners, ATI's Xclaim TV is the least expensive and easiest to set up, and it includes the best software. Its biggest drawback is that it works only with the Xclaim VR or AV-capable G3's.

Micro Conversions' Video Wizard is the costliest of the three tuners we tested, but it's the only one with an integrated graphics adapter. Although it doesn't offer much in the way of graphics acceleration, it *will* boost your Mac's display resolution while giving you video-input and -output capabilities.

If you don't have an Xclaim VR card (or G3) and don't need a graphics adapter, iXMicro's TurboTV is your only real choice; it costs just $120 and isn't tied to a specific vendor's video hardware. iXMicro's software falls far short of ATI's Xclaim Video Player, but a forthcoming upgrade should help narrow the gap.

Macworld LAB TEST

Faster than a Speeding Pixel?

As these numbers show, all six accelerators boosted at least some aspects of graphics performance, even on a Power Macintosh G3. Mactell's Vision 3D Pro II 250 offered the best 2-D acceleration, while ATI's Xclaim 3D and Xclaim VR gave the biggest 3-D boost. However, in our QuarkXPress scrolling test, the G3 did better on its own than with VillageTronic's Mac Picasso 540 + 3D Overdrive installed. And in our Walker Atrium test, the G3's built-in video offered better 3-D acceleration than iXMicro's ix3D Ultimate Rez.

Best overall performance. Longer bars and higher numbers are better. **Bold** indicates best result in a subsystem test. Editors' Choice winners' names in red. Scores are relative to that of each reference system's built-in video, which is assigned a score of 1.00. MacBench 4.0 scores are relative to that of a Power Mac 6100/60, which is assigned a score of 100.

	2-D ACCELERATION				3-D ACCELERATION		MACBENCH
	Word Scroll	Photoshop Scroll	QuarkXPress Scroll	Commotion Frame	Walker Atrium	Walker Spiral Staircase	Hi-Res Publishing Graphics
Power Macintosh G3/266							
ix3D Ultimate Rez	2.41	3.73	1.75	2.44	0.91	1.50	705
Mac Picasso 540 + 3D Overdrive	1.42	1.19	0.86	1.06	1.41	1.31	263
Nexus GA	2.17	2.95	1.56	2.33	1.41	2.30	597
Vision 3D Pro II 250	6.31	4.64	2.17	2.44	1.45	1.13	**772**
Xclaim 3D	2.01	2.37	1.46	2.33	1.45	2.36	547
Xclaim VR	2.02	2.36	1.47	2.44	1.45	2.30	548
Built-in Video	1.00	1.00	1.00	1.00	1.00	1.00	212
Power Macintosh 7300/200							
ix3D Ultimate Rez	1.51	5.65	3.28	1.39			528
Mac Picasso 540 + 3D Overdrive	1.00	2.14	2.09	0.64			245
Nexus GA	1.45	5.01	3.11	1.14			452
Vision 3D Pro II 250	3.24	9.07	3.80	1.43			**564**
Xclaim 3D	1.36	4.02	2.63	1.21			394
Xclaim VR	1.31	3.98	3.01	1.32			418
Built-in Video	1.00	1.00	1.00	1.00			205

Behind Our Tests

All cards were tested with the display set to 24-bit color in 1,152-by-870-pixel resolution. For the Adobe Photoshop and Puffin Designs Commotion tests, we used 256MB of RAM; for all other tests, we used 32MB. We performed a variety of scrolling tests in Microsoft Word 98, Adobe Photoshop 4.0.1, and QuarkXPress 4.0.1. Commotion 1.1 was used to measure frame-rate playback of a 48MB, 720-by-540-pixel D1-resolution digital-video file directly from RAM. For tests using LightWork Design's Walker 1.1, we loaded two 3DMF-format scene files and recorded their rendering frame rates; we used a window size of 350 by 350 pixels in 16-bit color for the Atrium file and 1,017 by 708 pixels in 24-bit color for the Spiral Staircase file. The MacBench 4.0 Hi-Res Publishing Graphics test uses playback scripts to exercise and measure the performance of the graphics subsystem.—**Macworld Lab testing supervised by Jeffy Milstead**

tions. Some developers say OpenGL offers faster performance than RAVE; it also benefits from cross-platform support.

Conix Enterprises (www.conix3d.com) just released software that makes it easier for developers to incorporate OpenGL into Mac applications, along with a QuickDraw 3D plug-in that lets RAVE accelerators boost the performance of graphics programs that support OpenGL. Hash and Strata already support OpenGL in their 3-D graphics software, and Autodessys says it's considering adding OpenGL support to its form-Z modeler. Don't be surprised if other 3-D developers follow suit.

Macworld's Buying Advice

For those who can't wait for OpenGL, Mactell's Vision 3D Pro II 250 offers the best combination of 2-D and 3-D graphics acceleration, along with nice extras such as an excellent hardware-enabled zoom function. However, at nearly $900, the card will also accelerate the flow of money from your bank account. ATI's less expensive Xclaim cards offer the best 3-D graphics acceleration, although they exhibited unwanted artifacts in some of our 3-D tests. ATI's Nexus GA card costs more but offers higher resolution.

Graphics pros who like to play computer games should consider VillageTronic's Mac Picasso 540 + 3D Overdrive, the only card in the roundup that includes 3Dfx's Voodoo chip set. TechWorks' Power3D uses the same chip set and costs just $250, but it won't accelerate graphics applications. m

Senior Editor STEPHEN BEALE covers graphics and publishing for *Macworld*.

EDITORS' CHOICE

Xclaim 3D This entry-level graphics accelerator, by far the cheapest of the bunch, offers excellent 3-D and decent 2-D acceleration. **Company:** ATI Technologies (905/882-2600, www.atitech.com). **List price:** $280.

Xclaim VR ATI's slightly more expensive card has the same basic hardware (and performance) as the Xclaim 3D but adds video-in and -out functions. **Company:** ATI Technologies (905/882-2600, www.atitech.com). **List price:** $400.

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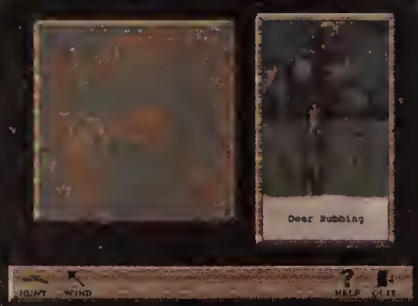

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Secrets

Office 98 Grab Bag

KEYS TO EASIER COLLABORATING AND OTHER CONVENIENT SECRETS

by Joseph Schorr

You're the first in your workgroup to get your hands on Microsoft's thoughtfully redesigned versions of Word, Excel, and PowerPoint—and you're loving it. With Office 98, you're working faster and more efficiently than ever before. To be honest, you're gloating shamelessly over the host of powerful new features that you alone have at your fingertips. And then suddenly it hits you: who else in the office is going to be able to open these files?

Actually, Microsoft has made it pretty easy to stay 100 percent compatible with users of earlier versions of Word, Excel, and PowerPoint—for those who take the proper precautions.

Keep Yourself Compatible

All three applications let you set a default format for saving new documents. If you often share documents with people who are using an older version of Word, Excel, or PowerPoint, you can make that earlier version the default format for saving files.

For example, suppose you're sharing files with a group of Word 5.0 users. In Word 98, open the Preferences dialog box (under the Tools menu) and click on the Save tab. Change the Save Word Files As: pop-up menu to Word 5.0 for the Macintosh. From now on, every new file you create will automatically be saved in Word 5.0 format. (You can always override the default by manually changing the file type in the Save or Save As dialog box.)

In Excel, you change the default format by choosing Preferences and clicking on the Transition tab. In PowerPoint, you find this option by clicking on the Save tab in the Preferences window.

Of course, you can accomplish this same task—intentionally saving documents in the format of an earlier version—by using the Save As command and changing the file type yourself. But setting the default saves you steps and liberates you from having to think about compatibility every time you save a document.

Even if you forget to save a Word document in a backward-compatible format, your colleagues can still open your Word 98 files in Word 5 or 6 if they have Microsoft's Word 97/98 Import Converter. PowerPoint 4.0 users can open PowerPoint 98 files, too, with the PowerPoint 97/98 Import Converter (both converters are available free at www.microsoft.com/macoffice/).

Alas, there's no Excel 98 converter.

continues

The Word Wide Web

ALL THREE OF THE MAIN OFFICE APPLICATIONS PROVIDE A Save As HTML option that allows you to turn documents into Web pages, but Word 98 also lets you do the reverse—capture a page directly from the Web and turn it into an editable Word document.

You don't even have to use a Web browser to pull off this stunt. Just choose Open Web Page from Word's file menu, and type in a URL. Word will use your TCP/IP connection to retrieve the page, even maintaining the graphics and layout of the original page and keeping any hyperlinked text active. If you connect to the Internet with a dial-up connection, Word will use your PPP software to access the URL.

Word isn't much of a Web browser—it gets overwhelmed by pages containing nested tables and numerous graphics—but this is a slick way to grab text off the Web and plug it in to another document without ever having to leave the comfort of your word processor.

The only way to share your Excel files with users of earlier versions of the spreadsheet program is to save your files in the appropriate file format. Fortunately, Excel 98 can save files formatted for versions 5.0, 4.0, 3.0, and 2.0.

Outgoing Mail

Office 98 improves collaboration not only among components of the suite but with third-party applications as well. A good example is the Send To command, which provides a direct hookup to your e-mail program. In the past, the only direct connection Office provided to e-mail was through Microsoft's own mail client. Now the entire suite can connect to most of the popular e-mail programs, including Microsoft's Outlook, Eudora Pro, and Claris Emailer.

Suppose you've got a spreadsheet in Excel and you want to use Emailer to mail it to a colleague. In the past, you would first have had to save the spreadsheet. Then you would have had to launch Emailer, create a new message, address it, attach the spreadsheet, and send the message off. Now you can configure the Office 98 programs so that they'll do most of the work for you. You can mail that spreadsheet, for example, just by choosing Mail Recipient from the Send To submenu. Excel automatically launches Emailer, creates a new message, and attaches the spreadsheet for you. All that's left for you to do is plug in an address and send off the message.

Setup is simple. The first time you use the Send To command, you have to have your e-mail program running in the background so Office can detect which one to use. After that, any Office program can launch the e-mail application by itself whenever you choose Send To.

Just for You

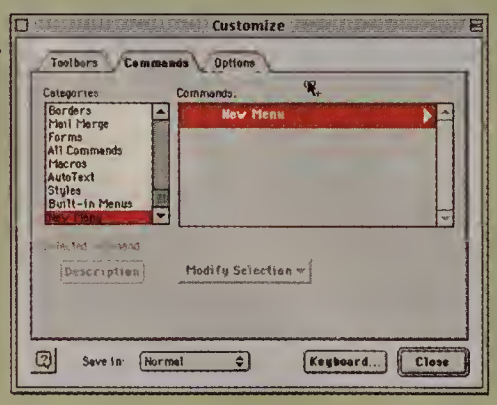
Office 98 is not only better at letting you collaborate with your colleagues but also offers many ways to simplify your own day-to-day work. As in the past, you can customize the Office applications to make them fit your working style, adding and removing commands and keyboard shortcuts. But the new versions of Word, Excel, and PowerPoint take customization a step further. For the first time, all three programs let you add and remove menus, rebuild tool bars, and create new buttons in exactly the same way. See "Reinventing the Tool Bar" for an example of how power users can redesign tool bars throughout the suite with customized pop-up menus. **m**

JOSEPH SCHORR is hard at work on the upcoming fifth edition of *Macworld Mac Secrets* (IDG Books Worldwide).

Reinventing the Tool Bar

OFFICE 98'S REVAMPED TOOL BARS ARE NEATER, MORE COMPACT, and easier to configure than the old ones—but all those buttons can still take up a lot of valuable screen space. Fortunately, all the main applications in Office 98 allow you to create your own custom *pop-up menus* on the tool bars, so you can have easy access to a large number of commands without having to use a lot of space.

A.



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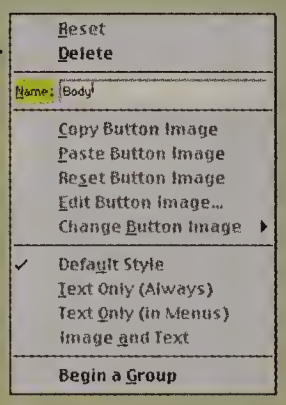

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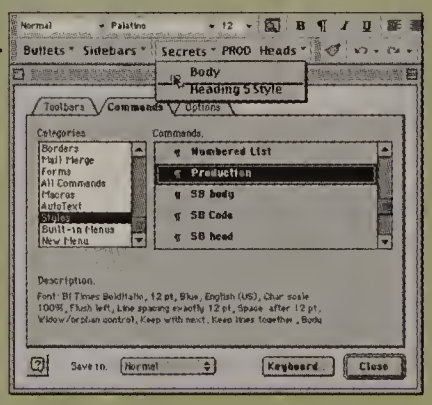

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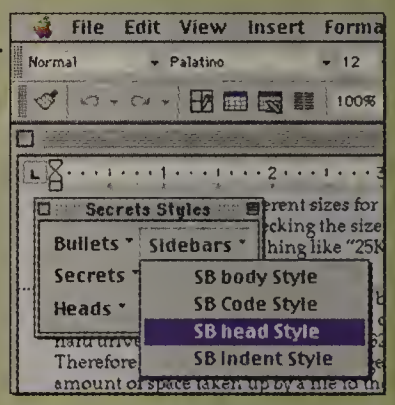

A. To make a new pop-up menu, choose Customize from the Tools menu. Click on the Commands tab, and then scroll the Categories list all the way to the end and click on New Menu. A new item, called New Menu, appears in the Commands field on the right. Drag New Menu onto the tool bar of your choice.

B. With the new menu on the tool bar still selected, click on the Modify Selection button in the Customize dialog box. Type in a name for your new menu in the Name field that pops up, and then press return.

C. To add items to your menu, pick a category of commands from the Categories list and then drag whatever commands you want from the Commands list on to your new menu. You can also ⌘-drag *existing* buttons on to your new menu so that they'll appear under the pop-up menu instead of on the tool bar itself.

D. The result is a tool bar (or floating palette) with pop-up menus containing exactly the commands you want.

Here's one great use for this feature: turn Word style sheets into submenu items to avoid scrolling through a giant list on the Formatting tool bar.

Choose Styles as the category in the Customize window, and drag the individual styles to submenus you've created.

Quick Tips

Tips, Tricks, and Shortcuts

by Lon Poole

When you upgrade to Apple's free QuickTime 3.0 software, you don't have to settle for the resulting feature downgrade of MoviePlayer. QuickTime 3.0 improves movie-playback quality, but you get only basic playback controls for free (www.apple.com/quicktime/); authoring and advanced playback controls now cost $29.95 through Apple's QuickTime 3.0 Pro upgrade. But you actually don't need to spend a cent to get back the lost features.

Gary Jensen of Alameda, California, found that a second copy of MoviePlayer 2.5 on his hard drive was untouched by the QuickTime 3.0 upgrade, because the upgrade targets only certain folders. When he launched the older MoviePlayer, it still had all of its original features, plus some new ones added by various components of the QuickTime 3.0 upgrade package. (If you don't have MoviePlayer 2.5, you can get it by selecting only the QuickTime 2.5 component in a custom installation of Mac OS 7.6 or later.)

He could play movies at half-normal and full-screen sizes; loop a movie and play it on a darkened background; cut, copy, and paste sequences; extract, delete, enable, and disable tracks; save changed movies and make new ones; and choose numerous other playing and editing options missing from the "upgraded" MoviePlayer 3.0.

What's more, various QuickTime 3.0 components give MoviePlayer 2.5 the ability to export movies in several new formats: BMP picture, Digital Video stream, Wave sound files (.wav), and µLaw sound files (.au). MoviePlayer 2.5 used with QuickTime 3.0 can also apply a dozen special effects such as Blur, Film Noise, and Sharpen. For more special effects such as Fire and Clouds, and transitions such as Cross Fade, Iris, and Wipe, you can download the free MakeEffectMovie program from the Utilities page of Apple's QuickTime Web site at www.apple.com/quicktime/developers/tools.html.

QuickTime 3.0 also enables MoviePlayer 2.5 to export a movie with various audio- and video-compression choices—your options include the efficient Sorenson Video codec (compressor/decompressor), and the QDesign Music and

Qualcomm PureVoice codecs. But there's a catch: the Sorenson Video and QDesign Music codecs built into QuickTime 3.0 are limited versions and can't produce the quality seen in Apple's sample movies. The $499 full-featured Sorenson Video Developer Edition and the $395 QDesign Music Encoder Pro are both available from Terran Interactive (408/356-7373, www.terran.com); you can buy both products together for $798.

If reinstalling MoviePlayer 2.5 is more hassle than you want, you can recover the missing features in MoviePlayer 3.0—and add a few more such as drag-and-drop editing—by paying Apple $29.95 for a serial-number key that unlocks the Pro features of QuickTime 3.0. The Pro key also upgrades the QuickTime Plug-in 2.0 that comes with the basic QuickTime 3.0 package, restoring the Save Movie As command to the contextual menu that appears when you hold down the mouse button with the pointer positioned over a movie in a Web page. This menu command is a standard feature of QuickTime Plug-in 1.1.1, which is compatible with QuickTime 3.0.

You can find detailed instructions for using MoviePlayer on the QuickTime Web site at www.apple.com/quicktime/information/macmovieplayer/. To see the features of MoviePlayer 2.5, 3.0 basic, and 3.0 Pro compared in detail, check out article 30503 in Apple's online Tech Info Library at http://til.info.apple.com/techinfo.nsf/artnum/n30503.

Viewing AVI Movies

Q. How can Macintosh users display movie files whose names end with .avi?

LARRY ST. GEORGE
Saint Johns, Michigan

A. Microsoft Internet Explorer 3.0 and 4.0 can display movies in Microsoft's AVI format without assistance from a plug-in or helper application. Netscape Navigator 3.0 and 4.0 and Communicator can also play them in the browser window after you install Apple's free Quick-

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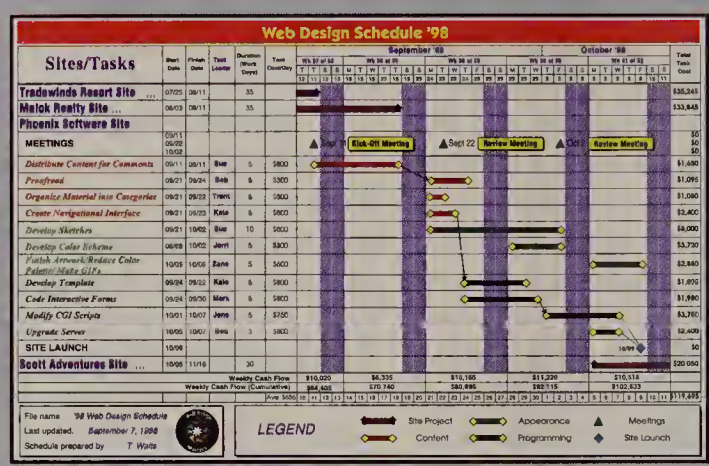

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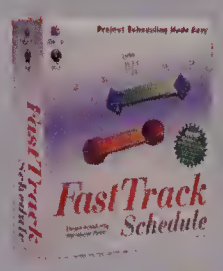

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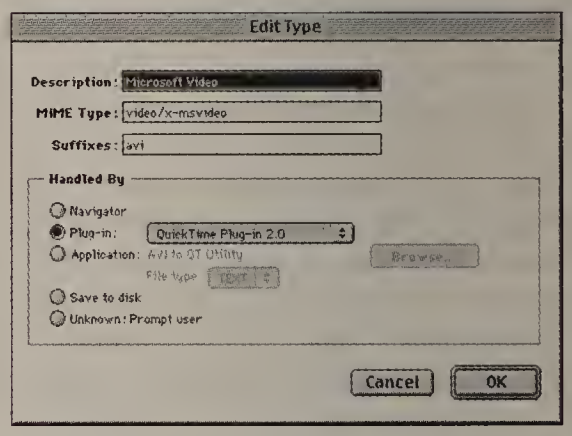
Time 3.0 software (see above) and drag the included QuickTime Plug-in 2.0 to Navigator's Plug-ins folder. You'll need to configure the plug-in as described on the QuickTime Plug-in Web page at www.apple.com/quicktime/information/macplugin.html, and you may have to reconfigure Navigator for AVI movies as shown in "AVI Preference."

Some AVI movies, however, are compressed with the Indeo Video codec, which is not included with QuickTime for Macintosh. You can get Indeo Video 3.2 from Intel at http://developer.intel.com/ial/indeo/video/archive.htm. Note that version 3.2 won't work with movies compressed using Indeo Video versions 4.0 or 5.0, which are not available for Macintosh.



AVI Preference If Netscape Navigator doesn't display AVI movies in the browser window after you install QuickTime Plug-in 2.0, you need to reconfigure a helper application. In Navigator 3.0, choose General Preferences from the Options menu and click the Helpers tab. In Navigator 4.0, choose Preferences from the Edit menu and select the Applications category. Then scroll to find a "Microsoft Video" item that's not assigned to the QuickTime Plug-in 2.0, and edit as shown.

Enjoying System Polygamy

Q. What's the extension or control panel that allows you to choose among several systems on the same drive, each in a different partition? I want to make a "fix-all" external drive that contains System 7.5 for our older Macs, as well as Mac OS 8.1 for our newer Macs that use HFS+.

JAMIE PELOQUIN
via Macworld Online

A. You're thinking of System Picker, a freeware application by Kevin Aitken of Apple Computer that you can download at ftp://ftp.apple.com/devworld/Utilities/. For Mac OS 8.0 and

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later, you'll need version 1.1a3. System Picker finds all System Folders on all mounted volumes and lets you designate which folder you want to use for start-up.

Since System Picker will still work if you have more than one System Folder on the same volume, you don't have to partition your external hard drive into multiple volumes. For example, install System 7.5 on your external hard drive and drag all its folders—System Folder, Apple Extras, and so forth—into a new folder named System 7.5. Then do a clean installation of Mac OS 8.1 on the same volume and drag its folders to a new folder named Mac OS 8.1. Now System Picker will let you choose either System Folder for start-up. Note that System Picker doesn't let you choose a system at start-up time; you have to start up, make your choice, and then restart.

Since you want to use your external drive with different Mac models, you should do a custom installation of both System 7.5 and Mac OS 8.1, and select the installation option Universal System For Any Supported Computer.

Delete Multiple Photoshop Layers

TIP Do you need to delete a large number of layers in an Adobe Photoshop file? Since you can't select multiple layers at once, hide all the layers except the ones you want removed. With one of the visible layers active, choose Merge Visible from the pop-up menu in the Layers palette. Then drag this single merged layer to the palette's Trash icon.

ROB MARQUARDT
Minneapolis, Minnesota

Making New Folders

TIP When you create a new folder within a folder, the Finder annoyingly won't let you place it directly in a folder you have selected in list view. Instead, the Finder adds the new folder to the top level of the list's hierarchy, so you have to drag the new folder into the nested folder where you want it. To streamline this process, I devised a macro in BinarySoft's KeyQuencer (shown in "New Folder Here").

BRET AARDEN
Ellenton, Florida

continues

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1) Get Mac OS 8.1.
Go to http://support.info.apple.com/ftp/8.1us.html or get the Mac OS 8.1 CD.

2) Get backup software you can trust.
Retrospect 4.0 is the most recommended backup software available. DantzLab has verified its full compatibility with Mac OS 8.1.

3) Before installing Mac OS 8.1, back up your hard disk.
Retrospect will back up your hard disk to whatever storage device you have—Zip, Jaz, SyQuest, CD-R, tape, even another hard disk. If you don't have a backup drive, get one, not just for Mac OS 8.1, but to protect all your files, every day, from disk crashes, viruses, fire, theft, even operator error.

4) Update your hard disk drivers.
Use Apple's or contact the manufacturer of your hard disk driver software for the latest version.

5) Install Mac OS 8.1.

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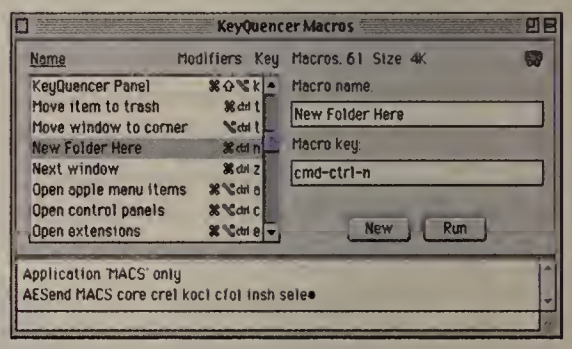
The following AppleScript also makes a new folder in the currently selected folder or disk:

```
tell application "Finder"
    make new folder in selection
end tell
```

You can run this AppleScript with the RunScript command in a KeyQuencer macro (requires KeyQuencer 2.1 or later, or $20 shareware KeyQuencer Lite 2.5 or later, both from BinarySoft; 310/449-1481, www.binarysoft.com); you will need to put AESend, Marco Piovanelli's freeware KeyQuencer



New Folder Here To make a new folder directly in any folder(s) you have selected in a hierarchical list view, use this macro in BinarySoft KeyQuencer or KeyQuencer Lite.

extension, in the KeyQuencer Extensions folder inside your System Folder. You can also run it in an AppleScript extension in a macro made with QuicKeys (CE Software; 515/221-1801, www.cesoft.com); and the AppleScript command in OneClick (Westcode Software; 619/487-9200, www.westcodesoft.com).

And don't overlook the low-tech approach suggested by Mark Sandau of Minneapolis. Create a new folder on your desktop, and option-drag this empty folder to any nested folder. Holding down the option key copies the folder, leaving the original on the desktop for the next time you need a new folder.—L.P. m

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Mac OS 8 Bible* (IDG Books Worldwide, 1997).

All shareware and freeware mentioned in *Quick Tips* is available from the Macworld Online software library (www.macdownload.com).

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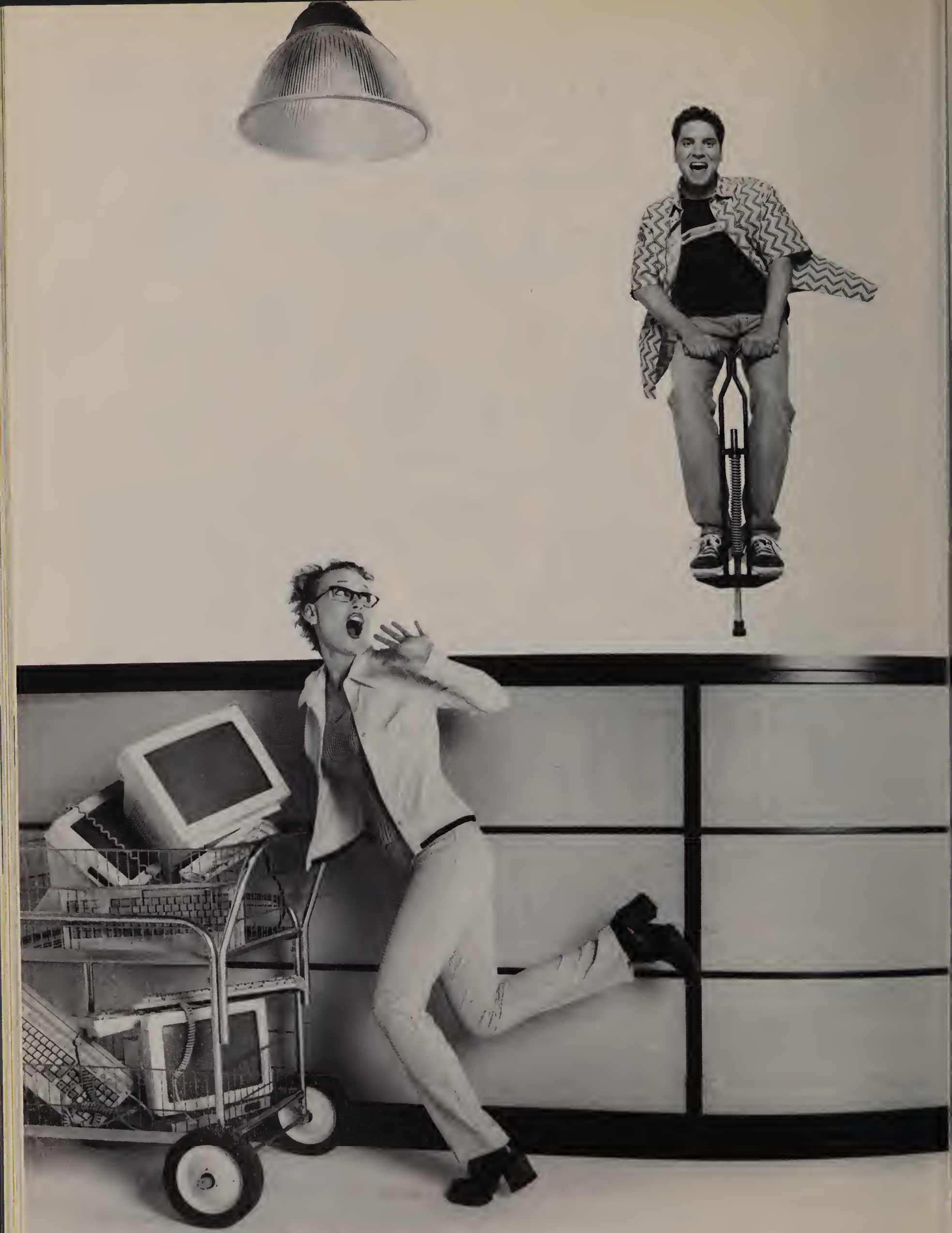

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create

WEB:GRAPHICS

Compress Web Graphics

Efficiency Is King over Low-Bandwidth Networks

by David Blatner

This month the Create *section is dedicated to helping you find the perfect balance between speed and quality when it comes to creating graphics, sound, and video for your Web site.*

The most common Web connection is also one of the slowest: the dial-up modem. A 28.8-Kbps modem can send about 2,000 or 3,000 bytes (or pixels or characters) per second. While that's plenty fast for text—much faster than we can read—it's pretty slow when you're transferring larger files, such as pictures. They can easily run into the hundreds of thousands of bytes.

Since you can't change your audience's bandwidth limitations, the recourse for Web designers is to use compression to get smaller file sizes. But there's no free lunch: the more you compress, the worse the image quality. And as we'll see, finding a good balance is as much art as science.

Compression Basics

There are two ways to compress images, making them smaller so that they'll transfer faster: *lossy* and *lossless* compression. Lossy compression (which is used in the JPEG file format) is like skimming a book or summarizing it: the data in the image is averaged out, so you get the gist but not necessarily all the details. Lossless compression (which is used in the GIF file format) is like rewriting the book so that all the details are there but are expressed in a more efficient form.

Here's the rule: The more detail in an image, the better lossy compression (JPEG) works over lossless (GIF). In practical terms, that means that scanned images—which contain a lot of detail—should be saved as JPEGs, and synthetic images (such as a line drawing, bitmapped text, or a cartoon) that contain little detail should be saved as GIFs. (I focus on just GIF and JPEG, since Web browsers don't fully support other graphic file formats on the Web, such as PNG and FlashPix.)

JPEG Compression

When you save a file in the JPEG file format (from Adobe Photoshop or any other image-editing program that supports this format), you can choose how compressed the image should be. The more compressed, however, the worse the quality.

Unfortunately, Photoshop doesn't let you preview the final image while you save it (although Adobe ImageReady, Macromedia Fireworks, and some plug-ins do; see "Exploring the Toolbox"), so you invariably have to save two or three copies

continues

PAUL WATSON

of the same image at various compression levels. In Photoshop 4, it's best to use the Save A Copy function, which saves each image independently of the original file.

After saving the different versions of your image to disk, compare each for quality and file size (see "The *Real* File Size"). Remember to view the images at Actual Pixels (100 percent) view—when you zoom in, the artifacts appear misleadingly horrible; when you zoom out, the artifacts blur away.

Note that colors can shift slightly when an image is saved in the JPEG format, so even colors that you think are *Web safe* (those that won't dither on 8-bit color screens) may not be safe after all. If your image requires Web-safe colors, transparency, or tiny details such as small text, you may need to use GIF instead.

GIF Compression

There's no sliding scale for GIF compression; this lossless format simply does as good a job as it can, rewriting the data in the image to optimize the file's size. However, the way you prepare your image before saving it can have a radical effect on the final GIF's size on disk (and therefore on how long the file takes to transmit).

GET SMALL
GIF's compression algorithms are better at compressing flat areas than noisy areas. The magnified image on the bottom is several bytes smaller than the one on the top.

Noisy

Flat

Here are four techniques for ensuring small GIF files:

• **Use solid areas.** The compression algorithms built into the GIF format are extremely good at reducing areas of flat color. More precisely, the algorithms can reduce rows of same-colored pixels to almost nothing. It's like the difference between saying "one red pixel, another red pixel, another red pixel . . . " versus "thirty-five red pixels in a row." The *noisier* the image (the more variance from one pixel to the next), the less GIF can compress it. Before you save your image, zoom in and scroll around to look for noisy areas that you can flatten (see "Get Small").

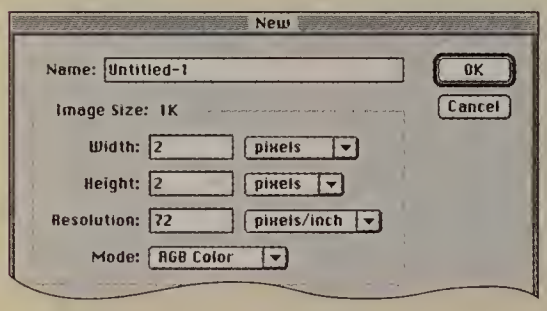
• **Turn off antialiasing.** If you're trying to save every byte, consider turning off antialiasing when painting, selecting, or filling areas of your image. Smooth, antialiased edges may look better in some cases, but they violate the "solid areas" rule, possibly causing

continues

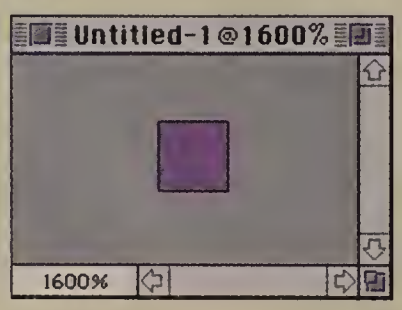
Controlled Dithering

IT'S TRUE THAT GIF'S COMPRESSION IS OPTIMIZED FOR AREAS OF flat color, but those areas don't have to be made up entirely of same-colored pixels. Any pattern of repeating pixels compresses well. For instance, a row of pixels colored "red, blue, red, blue . . . " compresses almost as well as one colored "red, red, red. . . . " The upshot is that you can create hybrid colors with alternating Web-safe colors, and because both original colors are Web safe, the final hybrid will be Web safe, too. Here's how to create a hybrid color in Photoshop. You can also use such programs as BoxTop Software's ColorSafe and Auto F/X's WebVise Totality.

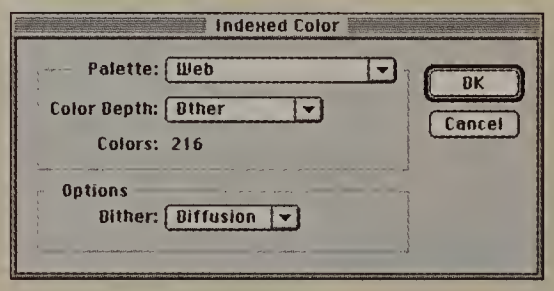
1 Open a new document in RGB mode, setting its width and height to 2 pixels.



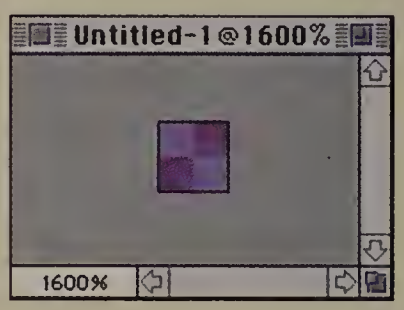
2 Fill all four pixels with the color you want to approximate. (Zoom in to 1,600 percent so that you can see the tiny pixels.)



3 Select Indexed Color from the Mode submenu (under the Image menu), and choose Web from the Palette pop-up menu.



When you click on OK, you'll see your hybrid color. (Sometimes the hybrid color is so subtle that you won't see a checkerboard pattern.)



4 Select all four pixels (⌘-A) and choose Define Pattern from the Edit menu to make your hybrid color into a pattern.

5 Now that you have your hybrid color as a pattern, you can fill an area with it (choose Fill from the Edit menu) or even paint with it (use the Rubber Stamp tool, and set the Options palette appropriately).

Detail

Full Image

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Exploring the Toolbox

WHILE PHOTOSHOP IS THE LEADING program for building and editing Web graphics, don't forget the other tools in the toolbox. Here's a short list of other programs and plug-ins to consider if you're serious about optimizing Web graphics.

Macromedia Fireworks ($299; www.macromedia.com) is an incredible new tool for building Web graphics, and it has several built-in optimization features, including the ability to preview an image as a JPEG and a GIF at the same time (see the screen shot).

Adobe ImageReady ($299; www.adobe.com) is an impressive program for optimizing Web graphics. It feels like Photoshop, but it's totally geared toward graphics for the Internet. It lets you preview the final image and its size as you dynamically change export settings (file format, color palette, numbers of colors, and so on) until you get the balance you want between file size and image quality.

BoxTop Software (www.boxtopsoft.com) has a number of plug-ins that work with Photoshop and other image-editing programs. Among the shareware products are **ImageVice** ($49.95), which can slim graphics even when you don't think they can get any smaller, and **ColorSafe** ($49.95), which automatically builds hybrid Web-safe colors. The company also publishes **Pro-JPEG** ($35) and **PhotoGIF** ($70), which offer enhanced control and previews for exporting GIF and JPEG files.

Auto F/X's **WebVise Totality** ($129; www.autofx.com) is an all-in-one plug-in that gives you more control over exporting GIFs and JPEGs than you would have with Photoshop alone. It's particularly nice to be able to switch among WebVise's various filters (including a digital watermarking control) within the same dialog box, rather than having to switch plug-ins.

Digital Frontiers' plug-ins **HVS ColorGIF** and **HVS JPEG** ($99 each or $159 as a bundle; www.digfrontiers.com) compress images quickly, although their interfaces aren't as elegant as some.

Fireworks' features go far beyond optimization, offering a number of paint and text tools that you can't find anywhere else.

the file to be larger than it needs to be.

• **Opt for vertical blends.** Blends (gradients) are notoriously difficult to compress in the GIF format. Often, it's better to save blends in JPEG instead, as though they were scanned images. However, if you want to save a blend as a GIF, you can conserve space by turning off Photoshop's Dither option and making the blend vertical rather than horizontal. Vertical blends are smaller because of the way GIF's algorithm compresses.

• **Use fewer colors.** In general, the fewer the colors in an image, the smaller the GIF will be. (However, this isn't always true. An image that has only 16 colors in it but that contains a lot of noise is significantly larger than one with 256 colors arrayed in areas of solid color.) You can reduce the number of colors in your image when you convert to Indexed Color or when you save an RGB image in the GIF file format, which automatically converts the file to Indexed Color.

Reducing the number of colors typically degrades the image, but usually not as much as you'd expect. You can almost certainly reduce the number of colors to 128 (7-bit), but you may be able to go even further—try 64 or 32 colors (6- or 5-bit), previewing the quality of each image. You can get a quick preview in Photoshop—leave the image in RGB mode, and use the Preview button in Photoshop's GIF89a export filter. Other programs, such as ImageReady, are built to let you preview these differences even more easily.

THE *REAL* FILE SIZE

The larger an image, the longer it takes to transmit through the wires. So it's important to know exactly how large your file is when you're making decisions about optimizing. Unfortunately, the Mac OS hides the true size of the file (the amount of data in the file) in the Get Info dialog box.

This is the amount of space the file takes up on disk.

This is the actual amount of data in the image—the amount transmitted over the Internet.

Less Filling, Looks Great

We all love using pictures to communicate, and yet when it comes to pushing them through wires, they're significantly bulkier than text. One of the best ways to enhance the viewing pleasure of people who will be looking at your images over the Web is to spend time now optimizing your graphics, saving your audience time later. **m**

DAVID BLATNER is the author of *Real World Photoshop 4* (Peachpit Press, 1997), *The Joy of Pi* (Walker and Co., 1997), and many others. Reach him at david@moo.com.

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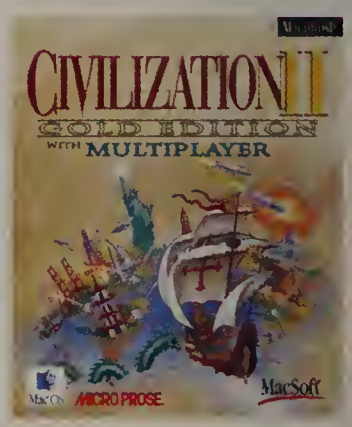


Macworld Online

create
WEB: SOUND

Slim Down Sound for the Web

QuickTime 3 Delivers Big Sound in Little Packages

by Christopher Breen

Although Web sites are jam-packed with ornate, whirling graphics and enough links to be the envy of the local sausage merchant, most remain remarkably mute. Granted, an aurally enhanced Web site requires more preparation and planning than one floating sweetly upon the wings of silence, but with the release of QuickTime 3 and its accompanying compression and streaming technologies, turning up the volume is easier than ever. With tools as simple as QuickTime Pro and a sound-conversion application, your Web site can warble with the best of 'em.

Your Sound Foundation

Digital-audio files are quite large. For example, a one-minute recording of stereo, CD-quality audio (16-bit, 44.1kHz) consumes approximately 10.6MB of hard-disk space. You can easily reduce the size of a sound file by adjusting three factors: the number of channels, the bit depth, and the resolution. Of course, you'll also give up a measure of quality. Melding two discrete tracks into a mono track causes the sound to forfeit its depth. Halving bit depth from 16 bits to 8 bits creates a grainier sound. And lowering resolution—say from 44.1kHz to 22.05kHz—again halves the file's size but also strips the sound of its brightness.

Some adjustments are more desirable than others. You can safely cut resolution from 44.1kHz to 22.05kHz because most computer speakers can't reproduce high frequencies. And although stereo sounds richer than mono, it's worth sacrificing for the sake of file size. The graininess of bit-depth reduction is noticeable, however, so you should reduce bit depth only for files where quality isn't a priority.

These three kinds of adjustments may be fine for CD-ROM and DVD-ROM projects, where bandwidth isn't a concern, but they simply can't trim enough fat to make anything but the smallest files Web-ready. Reduce our one-minute example to a mono, 8-bit, 22.05kHz file, and it still weighs in at a decidedly pudgy 1.3MB. You need auxiliary measures to reduce file size further, and in the world of Web audio, that can mean only one thing: compression.

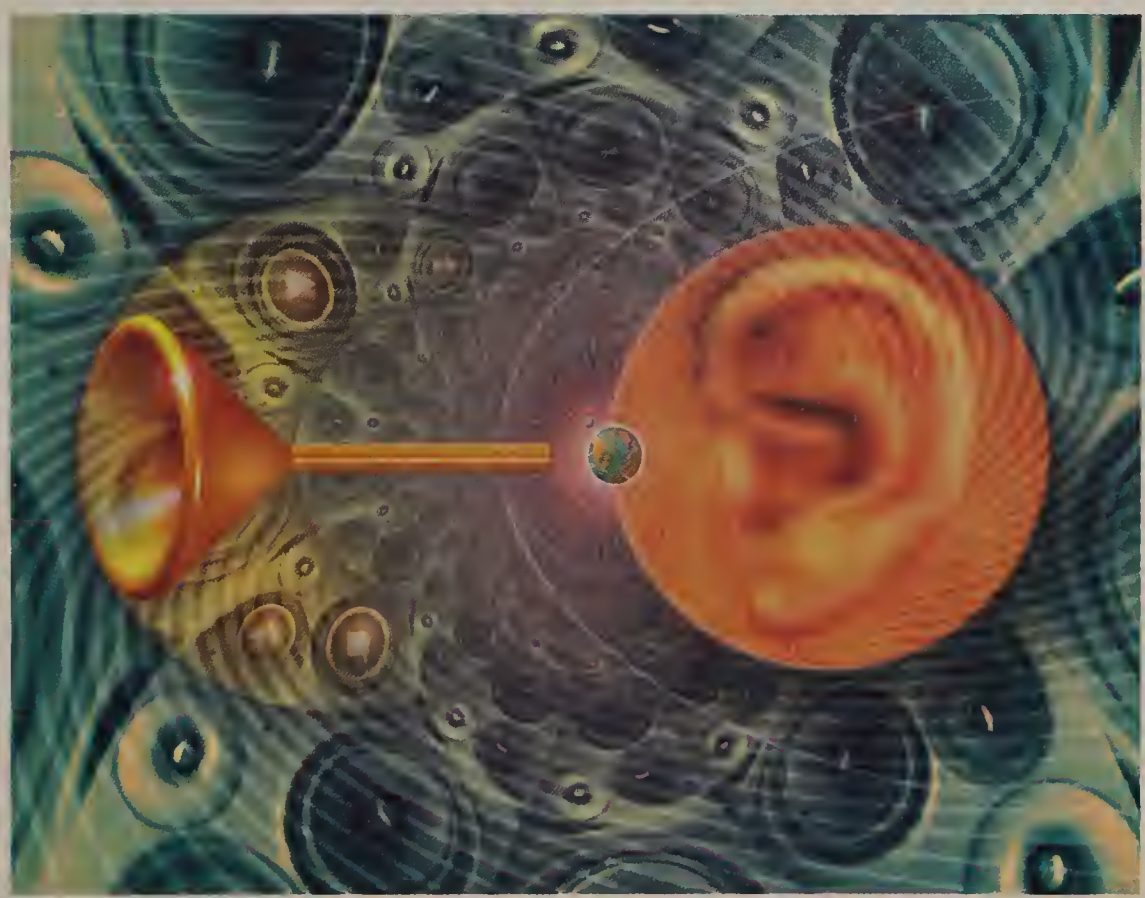
Optimization Is a Balancing Act

Audio compression is *lossy;* the compressor discards redundant and "less important" data. Losing this data negatively affects the quality of the sound. So the trick is to strike a balance between file size and audio quality.

Until recently, if you wanted to offer high-quality audio, you placed swollen files on your site and hoped visitors would be patient enough to sit through the download. Or you could maintain a measure of quality by lightly compressing these files with the 16-bit–only IMA 4:1 format introduced to the Mac with Apple's Sound Manager 3.1. Or you could throw quality to the wolves and make the files smaller still with Apple's MACE compression. Streaming audio (files that play as they download) was an option, but it meant accepting the decidedly low fidelity of such broadcast technologies as RealNetworks' RealAudio.

QuickTime 3 changed everything. It not only includes new compression technologies that drastically reduce file size while maintaining a reasonable level of quality, but it has also learned to stream, although not as quickly as RealAudio. You can now deliver better-sounding files more quickly than ever before.

continues

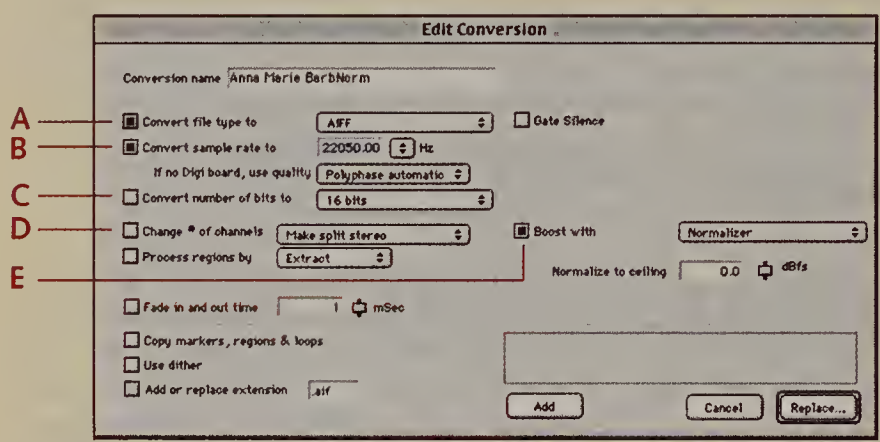


PAUL WATSON

Get Lean, High-Quality Web Sounds with QuickTime 3 Pro

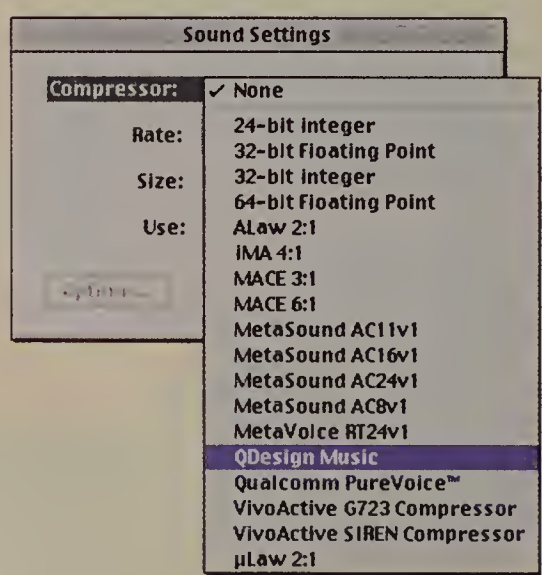
WHETHER YOU'VE MASTERED A DISC FOR YOUR OWN GARAGE band or you're using public-domain sound clips, CDs are a good source of high-quality audio for your Web site. To get CD sounds ready for the Web-page hit parade, you'll need to pungle up the $30 for QuickTime Pro, add a professional audio-capture application if you can afford it, and follow the steps below.

1 Capture Your Audio from CD Although you can extract sound from an audio CD with QuickTime Pro's MoviePlayer, you're better off using a conversion utility such as MacSourcery's BarbaBatch. BarbaBatch's CD-capture process skirts the QuickTime Toolbox, resulting in faster and more reliable audio capture. BarbaBatch allows you to optimize the sound file during the conversion process. You can change file type **(A)**, resolution **(B)**, bit rate **(C)**, and number of channels **(D)**. You can also normalize the sound—increase its overall volume **(E)**.



2 Convert Your Sound File with MoviePlayer Import your file into MoviePlayer 3.0 (not shown), and select Export from the File menu. In the Export File As pull-down menu, choose Movie To QuickTime Movie. Saving the sound file as a movie allows other QuickTime users—including those with PCs—to hear it. Click on the Options button to bring up the Sound Settings dialog box.

3 Choose a Compressor Click on Settings to access QuickTime's compressors (you'll also get access to MoviePlayer's controls for changing resolution, bit rate, and the number of channels). The Compressor pull-down menu reveals QuickTime's wealth of codecs. Select the QDesign Music codec (the best choice for music), and click on the Options button.



4 Choose a Bit Rate In the QDesign Music Encoder window, you can adjust the bit rate—the amount of compression applied to your sound. Higher bit rates, such as 48 Kbps and 40 Kbps, apply less compression, whereas low bit rates such as 10 Kbps and 8 Kbps severely reduce your sound's file size *and* quality.

5 Enable Streaming Now save your movie and let the compressor do its job. Once the export is finished, open the file, choose Save As from MoviePlayer's File menu, and click on the Make Movie Self-Contained option so that the movie can stream. If you're creating movies that contain references to other movies, see "Optimize Web Video for QuickTime 3," *Create*, in this issue.

6 Create the HTML The movie is now ready for placement on your site. Because it's a normal QuickTime movie—albeit one without a video track—you'll use the traditional **EMBED SRC** tag to place your file on the page. For example,

```
<EMBED SRC="cowgomoo.mov" WIDTH=120
HEIGHT=16 CONTROLLER=TRUE>
```

Ah, but because this is an audio-only file, there's no need to actually see it. Use the following code to have your audio file play in the background:

```
<EMBED SRC="cowgomoo.mov" WIDTH=2 HEIGHT=2
CONTROLLER=FALSE HIDDEN=TRUE AUTOPLAY=TRUE>
```

If you'd like the sound to endlessly loop, add this tag: **LOOP=TRUE**

TIP To let visitors stop the music if they want, make your movie visible but without a controller, and give it the same background color as your Web page; the movie now blends in like any graphic. The movie should contain your sound file plus a buttonlike graphic. Below the movie window, add instructions for visitors to click on the "button" to turn the sound on and off. Your code will look like this:

This clickable "button" gives visitors control.

```
<EMBED SRC="cowgomoowithpict.mov"
BGCOLOR=#000000 WIDTH=70 HEIGHT=70
CONTROLLER=FALSE AUTOPLAY=TRUE
LOOP=TRUE>
<FONT SIZE=-1>To stop the music, click once.
To restart, double-click.<BR>
```

New Compression Options

The two new compression schemes included with QuickTime 3 that are likely to interest audio enthusiasts are QDesign Music Codec, from QDesign (distributed by Terran Interactive; 408/278-9065, www.terran-int.com), and Qualcomm's PureVoice (619/587-1121, www.qualcomm.com).

QDesign Music Codec The QDesign codec (compressor/decompressor) can compress files to about 3 percent of original size while maintaining decent audio quality. As the name implies, this codec sounds best when applied to music—instrumental music in particular. With voices, the QDesign codec more clearly reveals its limitations. Files sound fluttery in the midrange, and at extreme settings, sounds seem to emanate from under water.

PureVoice The PureVoice codec is based on Code Division Multiple Access (CDMA), the encoding/decoding technology Qualcomm developed for use with the company's digital cellular phones. This codec is tuned to work best with speech, and encoded files can be compressed at either a 9:1 or 19:1 ratio. Files processed with PureVoice sound brighter than the original source file and exhibit the same fluttering in the midrange as QDesign-processed files.

BarbaBatch 2.3 (distributed by MacSourcery; 760/747-5995, www.macsourcery.com), a $395 professional batch-processing, audio-conversion utility, currently supports the PureVoice codec and should support QDesign Music Codec by the time you read this.

MPEG The QDesign and PureVoice codecs aren't your only QuickTime-compliant compression options. Apple's QuickTime MPEG Extension allows you to play MPEG movie and audio files with MoviePlayer. Although larger than files compressed with QDesign Music Codec, MPEG files can sound remarkably good. Just how good depends on the utility used to encode them. Regrettably, MoviePlayer isn't an encoding option—it can play, but not convert, MPEG files. Although you can find a number of MPEG encoders on the Web, you'll achieve the best results with BarbaBatch. In my tests, BarbaBatch created the smallest and cleanest MPEG files of any utility I tried. Two warnings: you need a fairly powerful processor to play MPEG files—at least a PowerPC or a Pentium—and neither BarbaBatch nor MoviePlayer is compatible with MPEG Layer III (the latest flavor of MPEG).

The Limits of Optimizing

Before you get wrapped up in the intricacies of bit rates, resolution, codecs, and multiple data rates, be sure that your source material is as good as you can make it. Always record source material at 16 bits, 44.1kHz, and then use a sound-conversion utility to alter it. If audio quality is paramount, use a professional sound card such as the Audiomedia III, from Digidesign (650/842-7900, www.digidesign.com), rather than your Mac's sound-in port to capture audio. Likewise, if you're capturing audio from a source other than a CD, consider a sound card. And finally, trim excess material from the beginning and end of your sound files.

QuickTime 3's new compression and streaming capabilities are mighty impressive, but no matter what, they won't enhance sloppy source material. Garbage is garbage, whether delivered in small piles or large. **m**

When not engaged in journalistic pursuits, CHRISTOPHER BREEN works as a musician in the San Francisco Bay Area.

Compression—How Much Is Enough?

THERE'S ONE EVER-PRESENT QUESTION when optimizing for the Web: do you choose high quality or opt for a fast download? The answer depends entirely on the purpose of your site. Let's look at three ways to break it down.

Quick and Dirty

If you simply want sound to enhance your site, you need files that will download quickly before your visitors scamper off to greener pastures. A mono, 16-bit, 11kHz (or less) file smushed with the QDesign codec is fine for such sounds.

Hi-Fi

If you're hawking your band's latest CD, you want files to sound as good as possible. High-quality streaming-audio files—stereo, 16 bit, 44.1kHz with the QDesign codec set to a bit rate of 24 Kbps or higher—is one way to go. Also consider creating MPEG-encoded files for music fans who have a processor that can handle MPEG playback.

In-Betweenies

For sites that fall between these extremes, create audio files that accommodate users logging on at various connection speeds. Using Apple's MakeRefMovie to create alternate tracks allows everyone who visits your site to sample your sounds (see "Optimize Web Video for QuickTime 3," *Create*, in this issue).

OPTIMIZE FOR T1 Go light on compression for users with high-speed T1 connections. A stereo, 16-bit, 44.1kHz file may take too long to start streaming, but a stereo, 16-bit, 22.05kHz file compressed with the QDesign codec set to 40 Kbps may work nicely.

OPTIMIZE FOR 28.8 KBPS Although you can create an interim track for those with ISDN or 56-Kbps connections (say, stereo, 16 bit, 22.05kHz, QDesign bit rate of 24 Kbps), your next most important track will be for those with 28.8-Kbps modems. Offer mono, 16-bit, 22.05kHz files with the QDesign codec set to 20 Kbps. If sound quality isn't a big concern, reduce resolution to 11.025kHz.

OPTIMIZE FOR 14.4 KBPS Modems operating at 14.4 Kbps are still common, so create a track for these users, too: mono, 16-bit, 11.025kHz files with a QDesign bit rate of 10 Kbps get the job done.

OPTIMIZE FOR SPEECH Fidelity isn't as big a concern for speech-based files, so make these movies small by giving them a quality level just short of annoying: mono, 16-bit, 11.025kHz (or less) files with the PureVoice codec set to either a 9:1 or 19:1 compression ratio.

OPTIMIZE FOR QUICKTIME 2 Finally, create one audio track with IMA 4:1 compression. Not everyone has upgraded to QuickTime 3, and this compression accommodates users with older versions of QuickTime.

Bookmarks

Mouse Jam's QuickTime 3 Test Page
Get down with your bad self in this online QuickTime jam
www.mousejam.com/qt30test.html

MPEG Audio Page Good informational source for audio compression
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Optimize Web Video for QuickTime 3

Add Movies to Your Site without Making Visitors Wait

by Jim Heid

Where the Web is concerned, the phrase *video quality* is almost as oxymoronic as *political ethics*. Bandwidth limitations, more commonly known as modems, force Web video producers to compromise on image quality, on the number of frames displayed per second, and on the dimensions of those frames.

But the picture is getting brighter. Modem speeds are oozing upward, but what's really making Web video more practical is software innovation. New compression schemes crunch video files into faster-downloading packages, while streaming-playback software enables those crunched videos to begin playing even as they download.

Apple's QuickTime 3, available for Mac OS and Windows computers, has made big strides in both compression and streaming playback. For compression, QuickTime 3 includes a new video compressor/decompressor (codec), called Sorenson Video, that provides higher quality at low bandwidths than the venerable Cinepak codec.

As for playback, QuickTime 3 makes it easy for Web developers to provide multiple versions of a movie, each tailored for a specific connection speed. The new QuickTime browser plug-in, which accompanies QuickTime 3, also helps by choosing the right movie for each visitor to your site—no need to create a separate page or link for each movie. You'll need to upgrade to the $29.99 QuickTime 3 Pro in order to get these features. (For details on the differences between QuickTime 3 and its Pro counterpart, see *Reviews*, July 1998.)

Here's a guide to optimizing Web video with QuickTime 3 and Apple's MoviePlayer 3.0, which is included with the QuickTime 3 download.

Consider the Source

The time to think about optimizing Web video quality is *before* you shoot your original footage. You'll get the best results if you follow a few simple rules.

- Keep motion to a minimum. The more movement you have from one frame to the next, the more poorly those frames will compress. Talking heads shot with a tripod-mounted camera yield far sharper Web video than speeding race cars shot with a handheld rig. Also minimize panning and zooming.
- Shoot in a high-quality format. If possible, use a high-quality video format such as Hi-8 or digital videocassette instead of the grainy VHS. Light your scenes well—dim interior shots are prone to video noise, which compresses poorly.
- Digitize the right way. To get smooth movies, run your Mac with a minimal number of extensions during digitizing, turn off AppleTalk, and capture to your fastest hard drive.
- Sound good. Don't forget about the audible half of your movie. See "Slim Down Sound for the Web," *Create*, in this issue, for details on QuickTime 3's new audio enhancements, and "Making Waves with Streaming Audio," *Create*, February 1998, for tips on optimizing audio quality.

Prepare for Compression

After you've digitized and edited your video using a package such as Adobe Premiere, you're ready to render a final QuickTime movie. You'll use this master movie as the starting point for your Web compression adventures, opening it in MoviePlayer Pro and then exporting the

continues

PAUL WATSON

Produce QuickTime Movies for the Web

WEB-BASED QUICKTIME MOVIES ARE MORE VIABLE THAN EVER, THANKS TO THE SORENSON codec and the new QuickTime browser plug-in's support for multiple–data-rate movies. Here's how to turn a finished QuickTime movie into a set of low-bandwidth movies for the Web.

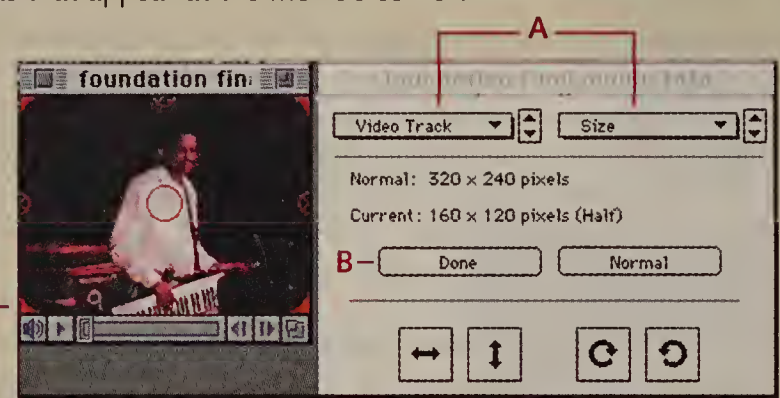
Part I: Create Multiple Movie Versions

1 Begin by opening your master movie in MoviePlayer Pro and resizing the movie: choose Get Info from the Movie menu and then use the Get Info window to specify the new size.

A Choose Video Track from the left-hand pop-up and Size from the right-hand pop-up.

B When the size-info window first appears, this button reads Adjust. Click on it to begin resizing, and its name changes to Done. When you've finished, click on Done.

C To resize using the mouse, drag any of the four red resize areas that appear at the movie's corners.



2 Compress the movie for a specific target bandwidth: Choose Movie Player Pro's Export command (be sure the Movie To QuickTime Movie option is selected). Click on the Options button to open the Movie Settings dialog and then specify your compression settings. To change video- and audio-compression settings, click on the video or audio Settings button. You'll get a dialog box like the one below if you press the video Settings button.

A Experiment with the Quality slider to find the best results.

B See main text for frame-rate and data-rate guidelines.

C A good starting point for Sorenson keyframing is to specify one key frame every 100 frames.

3 Repeat this process for each movie you want to create. For example, you may want to create three movies, one each for 28.8-Kbps, 56-Kbps, and ISDN and faster connections. Remember to end each file's name with the suffix .mov.

Part II: Make the Reference Movie

1 Create a new, untitled folder, for storing both the reference movie and the movies (compressed in part I) it points to.

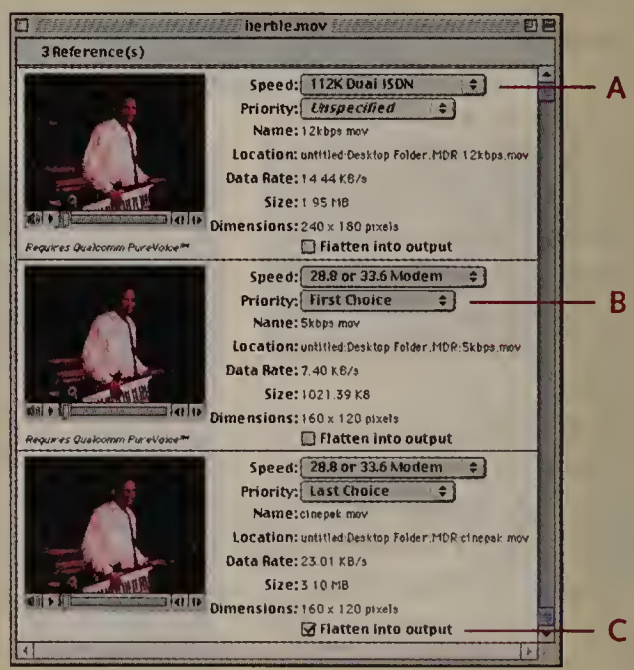
2 Launch MakeRefMovie, which presents a Save As dialog box where you name the reference movie. Navigate to the new folder you just created, type a name, and click on Save.

3 Drag and drop each of the movies you compressed into the MakeRefMovie window.

A Choose the connection speed appropriate to each movie.

B If your reference movie contains multiple movies with the same target bandwidth, use this pop-up to specify the movies' playback priority. In this example, there are two movies targeted for 28.8-Kbps and 33.6-Kbps modem playback. I want the Sorenson-compressed version to play whenever possible, so it's designated as the first choice.

C If you're including a Cinepak-compressed version of the movie for backward compatibility with older QuickTime versions, check this box.



4 Now you can save the reference movie and then upload it and the movies to which it points to your Web server. Important: Be sure to upload all the movies to the same directory.

Part III: Embed the Reference Movie

To add the movie to a Web page, use the **<embed>** tag. You'll find full documentation for the **<embed>** tag's attributes on the QuickTime Web site (see the "Bookmarks" sidebar).

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crunched versions (see "Produce QuickTime Movies for the Web" for step-by-step instructions).

Don't compress your master movie dramatically; you want to retain as much detail as possible and avoid introducing recompression artifacts. The Component Video compressor (which comes with QuickTime 3) is a good codec to use when rendering your master because it doesn't compress excessively.

When planning your Web compression strategies, two key factors to consider are the movie's frame size (the dimensions, in pixels, of each video frame) and its frame rate (the number of frames you hope to display each second). Both factors will influence your movie's bandwidth demands, and by weighing them against the movie's subject matter, you can arrive at the ideal combination of settings.

Common frame sizes for Web-destined QuickTime movies are, well, small: 160 by 120 pixels for movies intended to be downloaded over a modem; 240 by 180 pixels for ISDN speeds; and 320 by 240 for fat pipes such as cable modems, T1 lines, and local networks. As for frame rates, 10 frames per second is a reasonable rate for modem speeds, as is 12 to 15 fps for ISDN and better.

None of these values are cast in pixels; let your clip's subject matter influence the settings you use. For example, a clip containing landscape shots doesn't have a lot of action and therefore can use a slower frame rate—and that slower frame rate can allow for a larger frame size.

End Multimovie Clutter

In the Web world, it's common to provide multiple versions of a video or sound clip, each tailored to a specific connection speed. But this clutters up a site with a separate link or page for each file.

The new QuickTime browser plug-in eliminates these complications by letting you use a *reference movie*—a movie file that acts as a jumping-off point to other movie files. You link various versions of a movie to the reference movie, and then the QuickTime browser plug-in automatically chooses the movie version best suited to a visitor's connection speed. For instance, if a visitor to your site connects with a 28.8-Kbps modem, then the plug-in plays the movie you've created for that speed connection (see "How Reference Movies Work").

You can also use reference movies to provide backward compatibility for surfers who haven't yet upgraded to the QuickTime 3 plug-in (the version number of which, confusingly enough, is 2.0). Create a version of your movie that uses a QuickTime 2.X codec such as Cinepak, and visitors using elderly QuickTime plug-ins will see it instead of your glittering, Sorenson-compression movie.

To make reference movies, you need a free Apple utility called MakeRefMovie (which you can download from Apple's QuickTime Web site, www.apple.com/quicktime/developers/tools.html). If you're serious about Web-based QuickTime, you will also need Terran Interactive's (www.terran-int.com) $359 Media Cleaner Pro 3.0, which should be shipping by the time you read this. Media Cleaner Pro 3.0 makes creating reference and alternate movies a cinch. And it provides access to some advanced capabilities of the Sorenson codec, such as the ability to embed a watermark (a logo, for instance) within a movie.

The Bigger Picture

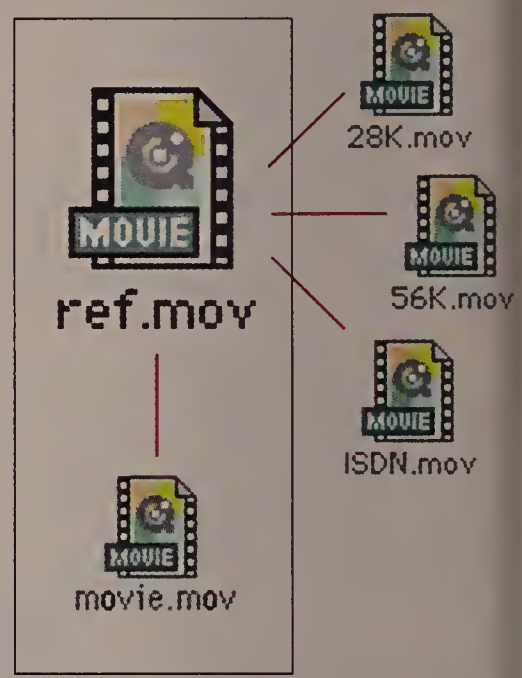
As a platform for streaming Web video, QuickTime still falls short of the most popular streaming-media technology, RealNetworks' RealMedia (see "Watch This: Streaming Video on Your Web Site," *Create*, April 1998). The QuickTime browser plug-in lacks RealPlayer's array of convenience features, such as buttons that let you jump to your favorite streaming sites. QuickTime's HTTP-based streaming isn't as reliable as the custom-protocol streaming of RealNetworks' RealMedia servers. And QuickTime doesn't support live broadcasts, although rumor has it this capability is in the works.

Still, QuickTime 3 remains an excellent choice for easy, economical Web video, thanks to the Sorenson codec, the new QuickTime browser plug-in, and QuickTime's cross-platform compatibility. Indeed, QuickTime 3's amazing array of enhancements is happy proof that although the phrase *video quality* may be an oxymoron in the Web world, the phrase *Apple innovation* isn't. **m**

JIM HEID (www.heidsite.com) is the author of *HTML & Web Publishing Secrets* (IDG Books Worldwide, 1997).

How Reference Movies Work

VERSION 2.0 OF THE QUICKTIME PLUG-IN, INCLUDED WITH QuickTime 3, supports reference movies, which can refer to alternate movies, each compressed for a specific connection speed. The alternate movies aren't stored within the reference movie; rather, the reference movie points to each alternate movie file. However, because older versions of the QuickTime plug-in don't support reference movies, you can include one alternate movie in the reference movie. Users who have the old plug-in see the alternate.



The reference movie points to alternate movies (at right) for QuickTime 3 users with different connection speeds.

This alternate movie is flattened into the reference movie for QuickTime 2.X users.

Bookmarks

QuickTime Webmaster's Haven
Info and tips for Web video producers
www.apple.com/quicktime/authors/webmas.html

Terran Interactive's Codec Central
Superb source of compression details
www.codeccentral.com

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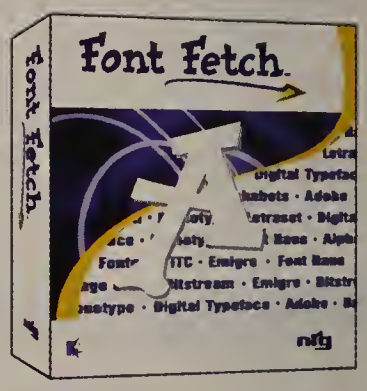

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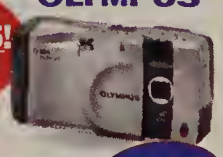

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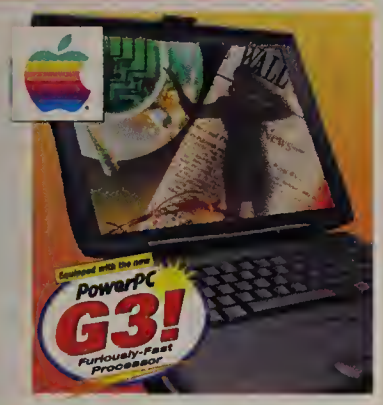

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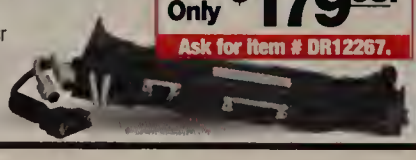

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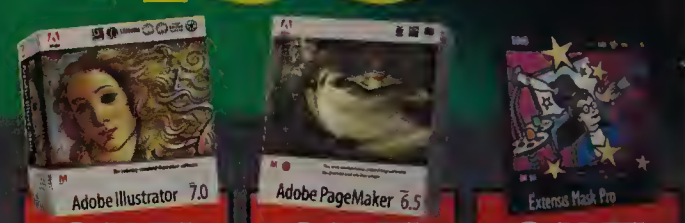

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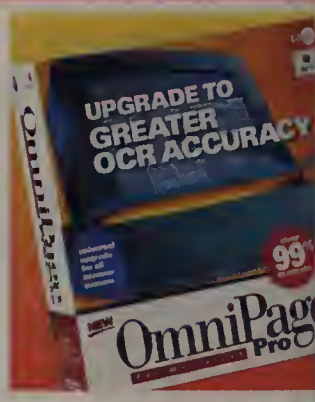

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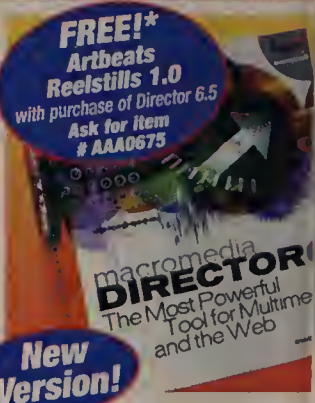

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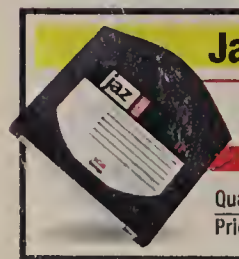

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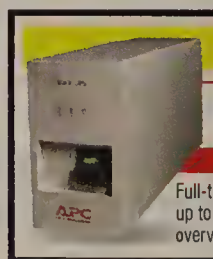

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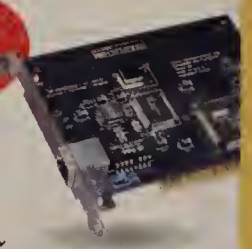

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- 20x CD-ROM drive for use in expansion bay
- Removable 1.44MB floppy disk drive for use in expansion bay (sold separately in #32519)

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- Features high-quality display, up to 14.1 inches (diagonal)
- 12.1 inch (diagonal) display features SVGA STN passive matrix display with support for thousands of colors at 800 x 600 pixel resolution
- 13.3 and 14.1 inch (diagonal) displays feature built-in TFT XGA active matrix displays, supporting millions of colors at 1,024 x 768 pixel resolution
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- S-video output for connecting to a TV (13.3" & 14.1" displays only)
- 16-bit CD quality stereo input/output
- Two built-in stereo speakers

Portability
- Includes one lithium-ion battery for up to 3.5 hours of normal use; supports two batteries for as much as 7 hours of use

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- Mac OS 8.1 which includes Internet access software, FAXStf, Now Contact & Up-to-Date and WebWhacker

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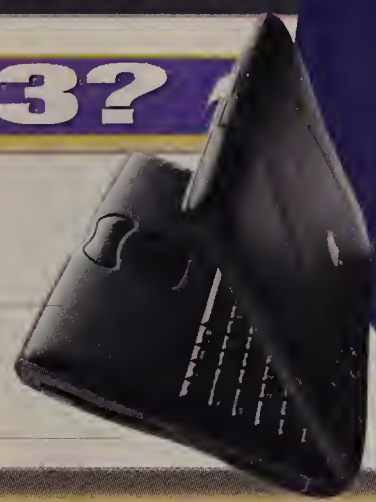

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Flip up keyboard gives easy access to RAM expansion slot & removable hard disk drive

New, more flexible configuration options!

Choose The G3 That's Right For You!

Order	Speed	RAM	HD	CD-ROM	Floppy	Modem	Display	Weight	Only	Or Lease
#32519	233MHz	32MB	2GB	20X	—	—	12.1" Passive matrix	7.2lbs.	$2,299	$92/mo
#32520	233MHz	32MB	2GB	20X	Included	56K	12.1" Passive matrix	7.2lbs.	$2,579	$104/mo
#32521	233MHz	32MB	2GB	20X	Included	—	13.3" Active matrix	7.6lbs.	$2,999	$120/mo
#32522	233MHz	32MB	2GB	20X	Included	—	14.1" Active matrix	7.8lbs.	$3,499	$140/mo
#32523	250MHz	32MB	4GB	20X	Included	56K	13.3" Active matrix	7.6lbs.	$3,899	$156/mo
#32524	292MHz	64MB	8GB	20X	Included	56K	14.1" Active matrix	7.8lbs.	$5,599	$224/mo

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Make your PowerBook G3 totally portable with these name-brand accessories!

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- 233, 266, or 300MHz PowerPC G3 processor
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- 66MHz system bus drive
- Integrated floating point unit and 64K on-chip level 1 cache (32K data/32K instruction)
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Storage
- 4 or 6GB IDE or SCSI hard drive
- 24x CD-ROM drive
- 1.44MB Floppy Disk Drive
- Iomega Zip 100MB SCSI Drive (select models)

Expansion options
- Three PCI expansion slots
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#32515	Mini-Tower	300MHz	64MB	4GB SCSI	24X	—	—	10Base-T	$3,359	$135/mo
Power Mac G3 Mini-Tower w/56K Modem and Communication Bundle Software included: *Microsoft Internet Explorer, Adobe PageMill, Microsoft Bookshelf 98, Now Up-to-Date and Contact, Netscape Navigator, SurfWatch, FAXstf BE, America Online, Master of Orion II, Jack Nicklaus 4*										
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#32514	Mini-Tower	266MHz	128MB	4GB SCSI	24X	—	—	10/100Base-T	$3,499	$152/mo
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Storage
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Expansion & Networking options
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- Built-in 33.6Kbps Modem
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Graphics, Video & Sound
- 2MB SGRAM (exp. to 4MB)
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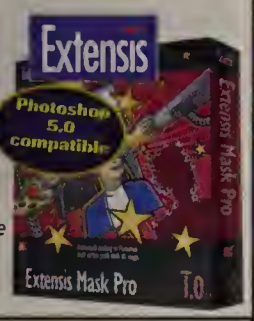

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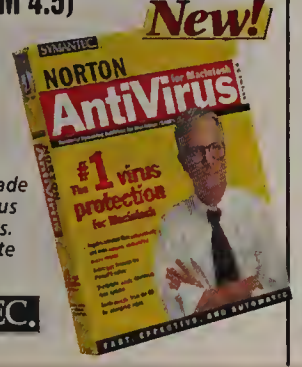

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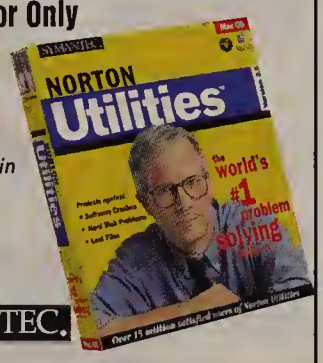

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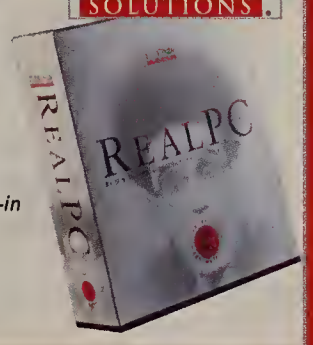

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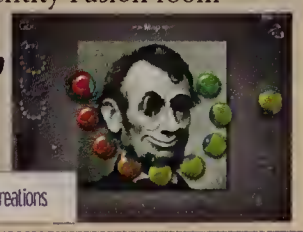

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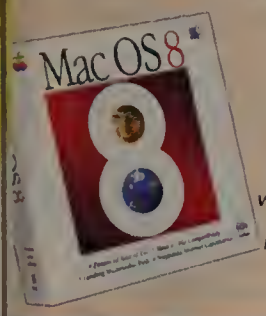

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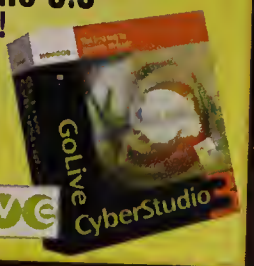

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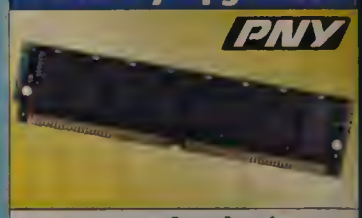

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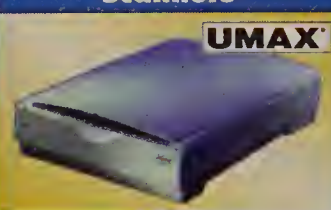

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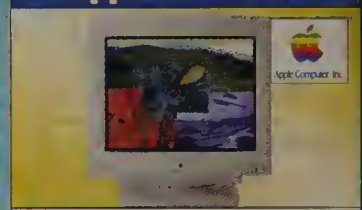

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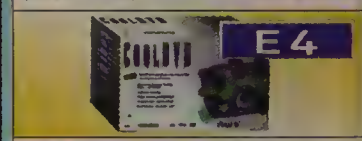

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ProDirect PowerSTOR™

All ProDirect hard drives feature only brand-new, high performance components. Our external drives come housed in our PowerStor enclosure with quiet cooling fan, active terminator, and 50 watt 110-220 auto-sensing power supply. And, all ProDirect external drives include all necessary system or daisy-chain cables.

BUYER: BE SURE TO READ THE FINE PRINT*

"• Your APS Drive unit may contain one or more components that were in prior use, but which have been inspected and repaired or rebuilt as necessary."

"• SCSI cables sold separately."

*From the APS Technologies advertisement in MacWeek 5/4/98 issue

EXTREME VALUE

IBM ULTRASTAR ES

		INTERNAL	EXTERNAL
2.1 GB	(DCAS32160)	$168	$228
2.1 GB Wide	(DCAS32160W)	$168	$258
4.3 GB	(DCAS34330S)	$325	$385
4.3 GB Wide	(DCAS34330W)	$330	$410

8ms Seek 512K Buffer 5400 RPM 5Year Warranty

STRATUS

New Heights of Value & Performance

Quantum Capacity for the Extraordinary	EXTERNAL	INTERNAL
2.1 GB	$189	$249
3.2 GB	$218	$278
4.3 GB	$248	$308
6.4 GB	$355	$415
8.4 GB	$475	$535

9.5ms Seek 512K Buffer 5400 RPM 5 Year Warranty

SCREAMIN' DEAL!

ATTO Express PCI Ultra2 LVD $495

For Use with New Low Voltage Differential Drives

Seagate ELITE

Awesome Capacity!

23 GB	(ST423451)	$1795	$1895
23 GB Wide	(ST423451W)	$1845	$1945

11ms Seek 2048K Buffer 5400 RPM

SCSI ACCELERATION

DEAL!

adaptec PowerDomain 2940

$179 with wide drive purchase

Ultra Wide PCI

MEMORY BLOW-OUT

APPLE CERTIFIED

HIGHEST QUALITY WITH LIFETIME WARRANTY

G3	G3	G3
32MB SDRAM	64MB SDRAM	128MB SDRAM
$49	$105	$225

SCREAMIN' DEAL!

SIMMS 72 PIN 60NS 16MB $46 32MB $83

168PIN	168PIN	168PIN
16MB DIMM	32MB DIMM	64MB DIMM
$32	$52	$107

Tape BACKUP

Speedy Tape Drives Perfect for AV Work or ON THE FLY INSTANT BACKUP!

IN STOCK TODAY

4-8GB QIC

Seagate 8000 QIC 4-8GB TAPE BACKUP $355 With Mac or PC/NT Software

RETROSPECT 4.0 SOFTWARE INCLUDED

CAPACITY	MODEL	TRANSFER RATE	SALE
8 GB	HP 1599	90 MB/Min.	1145
8 GB	CTD8000	60 MB/Min.	795
8 GB	Sony 7000	90 MB/Min.	975
24 GB	HP1554 DDS3	120 MB/Min.	1445
24 GB	Sony 9000 DD3	120 MB/Min.	1245
48 GB	HP1553 DDS2	60 MB/Min.	2485
50 GB	Sony AITSDX 300C 8mm	120 MB/Min.	3095
144 GB	HP1559 DDS3	120 MB/Min.	3995
150 GB	DLT™ 2500XT	150 MB/Min.	4895
210 GB	DLT™ 2700XT	150 MB/Min.	6395
200 GB	DLT™ 4500	180 MB/Min.	5595
280 GB	DLT™ 4700	180 MB/Min.	7695

INCREDIBLE DLT! 40GB DLT™4000 $2885 180MB/Min.

SPECTACULAR SPEED 50GB SONY AIT $2989 Up To 360MB/Min. *Compressed

BLISTERING SPEED 70GB DLT™7000 $6295 600MB/Min.

AWESOME SPEED 30GB DLT™2000XT $2575 150MB/Min.

Plug in a PowerRAID.™

There's no easier way to realize the affordability and enormous benefits of a Speed-tuned™ disk array storage system!

All PowerRaids are ready to use, Plug and Play and Include: Pre-Configured Adaptec 2940 Ultra Wide Accelerator (Also available with Multi Channel), Raid-Tuned Hard Drives, Raid Center Enclosures and "Remus Raid Software. And, all components are covered by a 5 year 48 hour replacement warranty.

for Maximum Data Transfer Rates

REPLACEMENT ProDIRECT 5 YEAR 48 HOUR WARRANTY

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NEW LVD UP TO 80MB/SEC. THROUGHPUT

DOUBLE Previous Ultra SCSI Technology!

RAID-Tuned to the highest possible transfer rates in the industry.

Seagate

PowerRAID™ SC18

18GB CHEETAH SPEED DEMON! FIXED: $2995 REMOVABLE: $3195

PowerRAID™ SC36

36GB CHEETAH MASSIVE SPEED! FIXED: $5595 REMOVABLE: $5995

GB	DRIVES	ACCEL CHANNEL	FIXED	HOT-SWAP
54	Cheetah ST19101W	Single	8295	8795
72	Cheetah ST19101W	Single	10295	11095

PowerRAID™ SB18

18GB BARRACUDA AWESOME 18! FIXED: $2395 REMOVABLE: $2575

PowerRAID™ SB36

36GB BARRACUDA FORMIDABLE 36! FIXED: $4495 REMOVABLE: $4850

GB	DRIVES	ACCEL CHANNEL	FIXED	HOT-SWAP
54	Barracuda ST19171W	Single	6635	7350

PowerRAID Ultra2AV

PowerRAID™ U218

18GB Viking Ultra2 FIXED: $2735 REMOVABLE: $2995

PowerRAID™ U236

36GB Viking Ultra2 FIXED: $4595 REMOVABLE: $4995

RAID	GB	DRIVES	FIXED	HOT-SWAP
PowerRAID U254		Viking Ultra2	6895	7395
PowerRAID U272		Viking Ultra2	9695	10595

Rack Mounted RAIDs

FEATURING PRODIRECT RAID-TUNED HARD DRIVES

All steel/aluminum construction with dual 300 watt redundant power supplies. Truly fault tolerant. Whatever your drive, accelerator and or throughput requirements, call ProDirect for a complete quotation.

CD Rom Drives

Panasonic

PLAY

	EXTERNAL
Pioneer 12x CD ROM	$145
NEC 24x CD ROM	$155

TOSHIBA PIONEER FREE TOAST SOFTWARE INCLUDED

Toshiba 32X CDRom $149

CD Recorders

YAMAHA RECORD

CRW 4260 EXTERNAL $575

CD Re-Writable Recorder with HUGE 2 Mb Buffer eliminates underruns while maintaining high speed recording.

4X CD RECORDER: Using CD Recordable Media, Write Music, Video or Data.

6X CD READER: As a Multi-Reed CD-Rom, read back the CD you just pressed.

2X CD RE-WRITABLE: Using Re-Writable Media, you can Write and Re-Write Your Data. Save Money by reusing your media...Great for editing or archival.

Panasonic CDR 7502 4X8X 4 Speed Recorder/8 Speed Player Huge 2 MB Buffer	$455
Yamaha CDR 400 4X6X	$525
CD-HD Mastering System Featuring Panasonic CDR 7502 & IBM UltraStar 2 GB AV Hard Drive	$795
CD-RD Mastering System Featuring Panasonic CDR 7502 and Iomega 1GB Jaz Drive	$895

CD Servers

SERVE

Brand/Model	No. of Drives	Speed	Price
CD Dataserver 824 Pioneer	8	24X	$3195
CD Dataserver 1624 Pioneer	16	24X	$4995

NEWER TECHNOLOGY G3 CARDS FOR PMAC 7300-9600

	MHZ/CACHE	
MaxPowr	250/125/512K	$745
MaxPowr	275/183/1MB	$1235
MaxPowr	275/275/1MB	$1925

REMOVABLE Storage

ZIP DISK BLITZ

100MB Zip Disks ONLY $9.99 ea.* *with any Drive Purchase

SCREAMIN' DEAL!

FREE CARTRIDGE **iomega ZIP $138** 100MB Internal*/External *Additional mounting brackets may be required with certain system models

FREE CARTRIDGE **iomega ZIP Plus $198** 100MB FASTER External

FREE CARTRIDGE **iomega JAZ $255** 1GB Internal

JAZ 1GB External $295

JAZ 1GB Cartridges $87.95

SyQuest SyJet $294 SyJet 1.5GB Cartridges $67 1.5GB External

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PowerDomain 3940 UWM Dual Channel PCI ..$539

ATTO Express PCI Ultra SCSI Single Channel $325

DualChannel Express PCI Ultra SCSI 3 40 MB Sec. ..$589

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ULTRA SCSI					Int	Ext
2111MB	5400rpm	512K	FB32100S	3yr	$205	$265
3228MB	5400rpm	512K	FB33200S	3yr	$237	$297
4310MB	5400rpm	512K	FB34300S	3yr	$269	$329
6448MB	5400rpm	512K	FB36400S	3yr	$350	$410
8455MB	5400rpm	512K	FB38400S	3yr	$455	$515
9100MB	7200rpm	1024K	XP309100S	5yr	$729	$779
18200MB	7200rpm	1024K	XP318200S	5yr	$1279	$1329
ULTRA WIDE SCSI						
4550MB	7200rpm	512K	VK304550W	5yr	$395	$485
9100MB	7200rpm	512K	VK309100W	5yr	$599	$689
ULTRA 2 SCSI						
4550MB	7200rpm	512K	VK304550LW	5yr	$399	$529
9100MB	7200rpm	512K	VK309100LW	5yr	$629	$759
9100MB	7200rpm	1024K	XP309100LW	5yr	$729	$859
4550MB	7200rpm	1024K	XP318200LW	5yr	$1279	$1409
ULTRA IDE						
2111MB	5400rpm	512K	FB32100A	3yr	$136	
3228MB	5400rpm	512K	FB33200A	3yr	$146	
4310MB	5400rpm	512K	FB34300A	3yr	$167	
5130MB	5400rpm	512K	FB305100A	3yr	$187	
6448MB	5400rpm	512K	FB36400A	3yr	$208	
8455MB	5400rpm	512K	FB38400A	3yr	$286	
10262MB	5400rpm	512K	FB310200A	3yr	$327	

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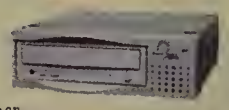
Quantum

Capacity for the Extraordinary

• CD RECORDERS •

Smart Storage Solutions CDR Drives Include:
- ✔ Toast Mastering Software
- ✔ 5 FREE disks
- ✔ Toll Free support

4x8 CDR $399

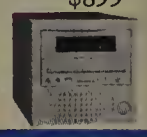


Includes Toast & DirectCD Software!

DirectCD from Adaptec now makes a CD Recorder as easy to use as a hard drive.

CD RECORDABLE Includes 5 Free Recordable Disks!	External	Duo
2x6 Sony mechanism, caddy load, 1MB buffer	$369	$689
4x6 Yamaha mechanism, tray load, 2MB buffer	$499	$809
4x8 Matsushita (Panasonic) mechanism, tray load, 1MB buffer	**$399**	$709
4x12 Teac mechanism, tray load, 1MB buffer	$489	$799
4x12 Plextor mechanism, caddy/tray load, 1MB buffer	$579	$889
CD REWRITABLE Includes 5 Free ReWritable Disks!		
2x6 Philips mechanism, tray load, 1MB buffer	$419	n/a
2x6 Ricoh mechanism, tray load, 1MB buffer	$469	$779
2x6 Ricoh mechanism, caddy load, 2MB buffer	$519	$829
2x4x6 Yamaha mechanism, tray load, 2MB buffer	$589	$899

Duo Master is one of the most innovative CD mastering solutions available. Jaz or Syjet drive and CDR in one unit. Create your master on the Jaz or Syjet cartridge drive and then master directly to the CD. This is the perfect CD mastering setup! Includes 5 free recordable CDs and 1 free cartridge.



• SCSI HARD DRIVES •

Seagate

4520MB	7200rpm	512K	ST34520N	3yr	$305	$365
4550MB	7200rpm	512K	ST34573N	5yr	$509	$569
4550MB	10,000rpm	512K	ST34501N	5yr	$579	$639
6530MB	7200rpm	512K	ST36530N	3yr	$419	$479
9100MB	10,000rpm	512K	ST19101N	5yr	$899	$959
9140MB	7200rpm	512K	ST39140N	3yr	$539	$599
9190MB	7200rpm	1024K	ST39173N	5yr	$689	$749
18200MB	7200rpm	1024K	ST118273N	5yr	$1279	$1339
23200MB	5400rpm	512K	ST423451N	5yr	$1429	$1529
ULTRA WIDE SCSI						
4520MB	7200rpm	512K	ST34520W	3yr	$305	$395
4550MB	7200rpm	512K	ST34573W	5yr	$509	$599
4550MB	10,000rpm	512K	ST34501W	5yr	$579	$669
6530MB	7200rpm	512K	ST36530W	3yr	$419	$499
9100MB	10,000rpm	512K	ST19101W	5yr	$869	$959
9140MB	7200rpm	512K	ST39140W	3yr	$539	$629
9190MB	7200rpm	1024K	ST39173W	5yr	$689	$779
18200MB	7200rpm	1024K	ST118273W	5yr	$1279	$1369
23200MB	5400rpm	512K	ST423451W	5yr	$1429	$1599
ULTRA 2 SCSI						
4550MB	7200rpm	1024K	ST34573LW	5yr	$535	$665
4550MB	10,000rpm	1024K	ST34502LW	5yr	$599	$729
9100MB	10,000rpm	1024K	ST39102LW	5yr	$925	$1055
9190MB	10,000rpm	1024K	ST39173LW	5yr	$709	$839
18200MB	7200rpm	1024K	ST118273LW	5yr	$1279	$1409
18200MB	10,000rpm	1024K	ST118202LW	5yr	$1659	$1789

IBM

4550MB	5400rpm	512K	IBM34330N	5yr	$249	$309
9100MB	7200rpm	512K	IBM39130N	5yr	$589	$649
18200MB	7200rpm	1MB	IDGHS18Z	5yr	$1279	$1339
ULTRA WIDE SCSI						
4550MB	5400rpm	512K	IBM34330W	5yr	$269	$359
9100MB	7200rpm	512K	IBM39130W	5yr	$609	$699
9100MB	10020rpm	1MB	IDVGS9U	5yr	$889	$979
18200MB	7200rpm	1MB	IDGHS18U	5yr	$1279	$1369

WESTERN DIGITAL

2100MB	7200rpm	512K	WDE2170N	5yr	$309	$369
4300MB	7200rpm	512K	WDE4360N	5yr	$409	$469
9100MB	7200rpm	512K	WDE9100N	5yr	$659	$719
ULTRA WIDE SCSI						
2100MB	7200rpm	512K	WDE2170W	5yr	$319	$399
4300MB	7200rpm	512K	WDE4360W	5yr	$419	$499
9100MB	7200rpm	512K	WDE9100W	5yr	$669	$759

FUJITSU

ULTRA WIDE SCSI						
4550MB	7200rpm	512K	M3045W	5yr	$385	$515
9100MB	7200rpm	512K	M3091W	5yr	$659	$789
18200MB	7200rpm	512K	M3182SW	5yr	$1239	$1369

• SALE ITEMS •

9GB Hard Drives

	Internal	External
Quantum Ultra Wide	**$599**	**$689**
IBM Ultra SCSI	**$589**	**$649**
IBM Ultra Wide	**$609**	**$699**

CD Rewritable Drive

	External
Philips with Toast & 1 disk CDD3600M1	**$379**

PERFORMANCE RAID

2 Ultra Wide drives in external case
Adaptec controller with RAID software

18GB (2- 9GB drives) MAC18RAID	**$1599**
36GB (2 - 18GB drives) MAC36RAID	**$2979**

• MISCELLANEOUS •

HITACHI 2.5" IDE Drives		
4.0GB DK227A41 $399	5GB DK227A50	$459
IOMEGA Drives		Call for best price
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PCI Wide Single Channel	A2940MUW	$269
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PCI FireWire + Wide SCSI	AHA8945	$639
PCI Ultra 2	A2940MU2W	$Call
ATTO Controllers		
PCI Fibre Channel	ATTOPC1FC	$889
PCI Ultra 2 SCSI	ATTOPC1U2	$469
above w/ RAID software & cable	ATTOPCIU2K	$669
Cool DVD Kit		
Complete kit for Mac G3 computers	DVDMAC	$469
Maxoptix Optical Drives		
2.6GB	T5-2600	$1149
5.2GB	T6-5200	$1499
Sony Optical Drives		
5.2GB	SMOF551	$1599
Fujitsu Optical Drives		
640MB (mail in offer for 3 disks until 9/30/98)	DYNAMO640SE	$329

We sell:
All brands of hard drives, tape drives, optical drives, CD duplicators, CD recorders, CD mastering software, CD towers, CD ROM, RAID adapters and software, controllers, enclosures, mounting brackets, PCMCIA adapters and drives, laptop hard drives, & much more. Check out our web site or call us with your requirements.

• CDR MEDIA •

Nobody beats MegaHaus for CD Recordable Media prices! We will not be undersold. If by chance you do find a lower price, call us.

	CDR74	CDR74W	CDR74P
5 Pack	$21/$19	$89/$84	$28/$25
20 Pack	$42/$39	$340/$335	$65/$62
50 Pack	$93/$89	$799/$789	$139/$135
100 Pack	$175/$169	$1500/$1480	$259/$249
Budget 5 Pack	$19/$17	$80/$76	$24/$21
Budget 20 Pack	$36/$33	$299/$289	$55/$52
Budget 50 Pack	$74/$70	$699/$689	$119/$109
Budget 100 Pack	$139/$129	$1299/$1289	$230/$220

CDR74 is recordable, CDR74W is rewritable, CDR74P is printable. Price is alone/with CDR purchase.

• CD ROM DRIVES •

These CD ROM drives are the best in the industry. Price is bare drive/external with software.

			Bare	Ext
16X- 5 disc changer	Nakamichi	MJS16XM16X	$189	$249
24X	NEC	CDR1810XM24X	$85	$145
32X - Slot load	Pioneer	DRX32SXM32X	$92	$152
32X	Toshiba	XM6201BXM32X	$102	$162
32X - 512K buffer	Plextor	PX32TSXM32X	$145	$205

• SCSI TAPE BACKUP •

These tape drives include backup software for Mac, Win95, WinNT, and 1 FREE TAPE!

HP 4mm	2GB	11MB/min	C1534XM	$649
Seagate 4mm	2-4GB	66MB/min	STD24000XM	$619
HP 4mm	2-4GB	42MB/min	C1536XM	$689
Seagate TR4	4GB	30MB/min	STT28000XM	$409
Seagate TR4	4-8GB	60MB/min	STT28000CXM	$539
Sony 4mm	4-8GB	44MB/min	SDT5000XM	$679
Sony 4mm	4-8GB	90MB/min	SDT7000XM	$679
Seagate 4mm	4-8GB	60MB/min	STD28000XM	$829
HP 4mm	4-8GB	60MB/min	C1599XM	$819
Exabyte 8mm	7-14GB	60MB/min	EXB8700LTXM	$719
Exabyte 8mm	7-14GB	120MB/min	ELIANTXM	$1449
Sony 4mm	12-24GB	144MB/min	SDT9000XM	$999
Seagate 4mm	12-24GB	120MB/min	STD224000XM	$1089
HP 4mm	12-24GB	120MB/min	C1554XM	$1139
Quantum DLT	15-30GB	150MB/min	DLT2000XTXM	$2449
Exabyte 8mm	20-40GB	360MB/min	EXB8900XM	$3549
Quantum DLT	20-40GB	180MB/min	DLT4000XM	$2729
Seagate AIT	25-50GB	360MB/min	STA150000XM	$2999
Sony 4mm	32-64GB	90MB/min	TSL7000XM	$1949
Quantum DLT	35-70GB	600MB/min	DLT7000XM	$5799
Seagate 4mm	48-96GB	120MB/min	STL496000XM	$2419
Exabyte 8mm	70-140GB	60MB/min	EXB10HM	$3949
HP 4mm	72-144GB	120MB/min	C5648XM	$2699
Quantum DLT	75-150GB	150MB/min	DLT2500XTM	$4429
Quantum DLT	100-200GB	180MB/min	DLT4500M	$5549
Quantum DLT	105-210GB	150MB/min	DLT2700XTM	$6099
Quantum DLT	140-180GB	150MB/min	DLT4700M	$7419

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SyQuest 200/270 .....59/79
RICOH CDR 74 Min $1.99
Sony DAT 120m $29
Iomega Jaz 5-Pack.....$379

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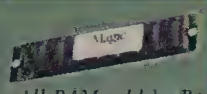

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PCI PowerMac, UMAX, PowerCC
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Exclusively for the new G3 Macs
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256MB 100Mhz SDRAM $525

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SIMMs 72-Pin
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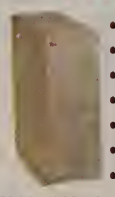

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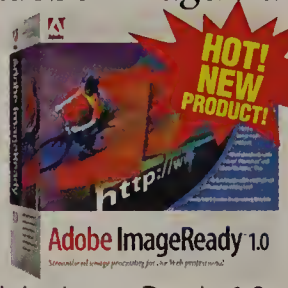

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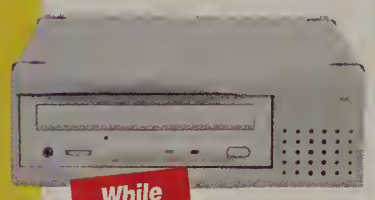

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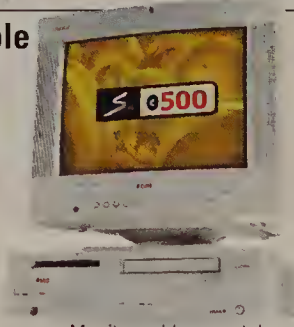

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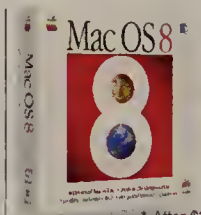

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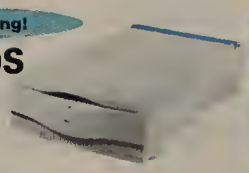

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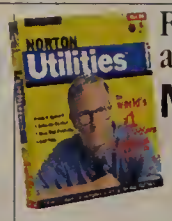

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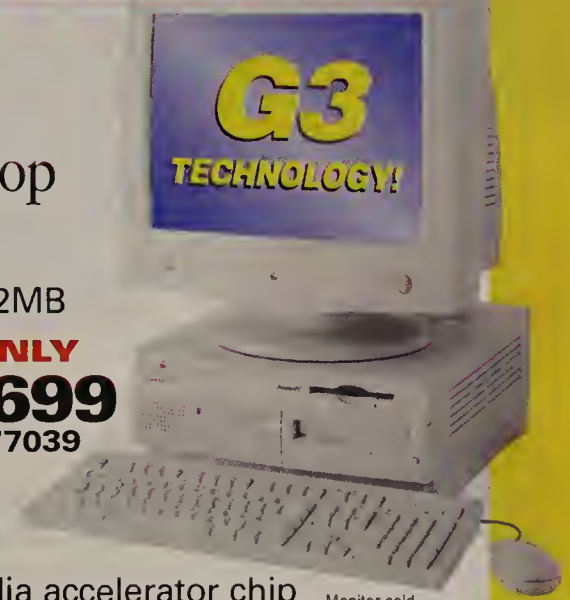

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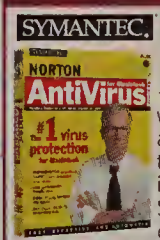

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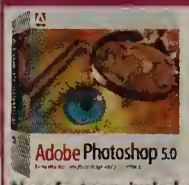

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Quantum 6.4GB 5400 rpm Stratus 9ms	$359	$419	
Quantum 8.4GB 5400 rpm Stratus 9ms	$479	$539	
Quantum 9.1GB 7200 rpm Atlas III 7.9ms	$869	$939	
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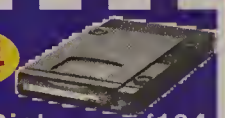

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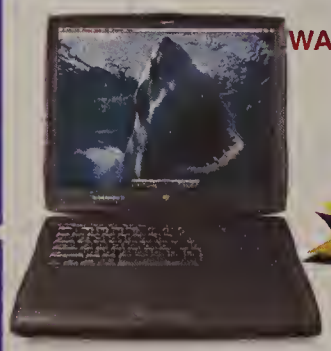

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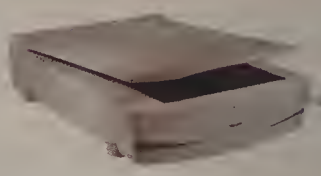

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APS Q 6400	Quantum Fireball ST, 6236MB, 5.4K	359.95	379.95	439.95	469.95
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APS Q 4500	Quantum Viking, 4345MB, 7200 rpm	289.95	309.95	N/A	399.95
APS ST 2000	Seagate Barracuda, 2157MB, 7200 rpm	329.95	349.95	N/A	449.95
APS ST 4300	Seagate Barracuda, 4340MB, 7200 rpm	479.95	499.95	N/A	599.95
APS ST 4500	Seagate Cheetah, 4348MB, 10,000 rpm	579.95	599.95	N/A	699.95
APS ST 9000	Seagate Barracuda, 8683MB, 7200 rpm	759.95	769.95	N/A	869.95
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APS ST 18000	Seagate Barracuda 18200GB, 7200 rpm	1,579.95	1,599.95	1,689.95	N/A
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APS ST 9000 W	Seagate Barracuda, 8683MB, 7200 rpm	779.95	799.95	899.95
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APS HyperDAT®	DDS-2DC, 8GB	549.95	599.95
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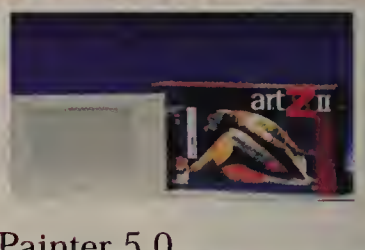

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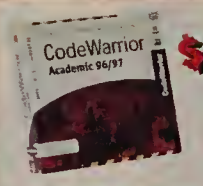

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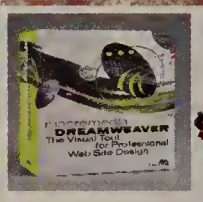

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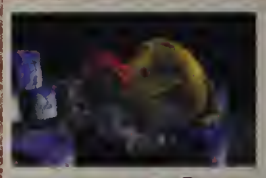

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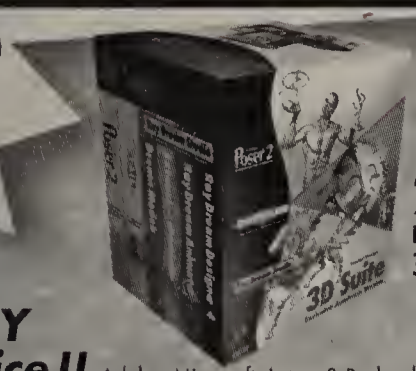

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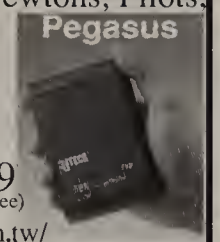

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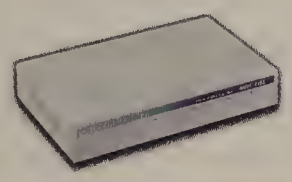

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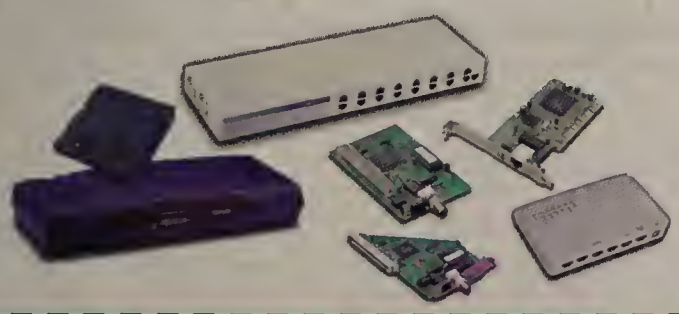

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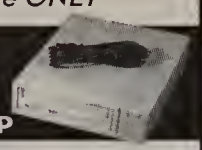

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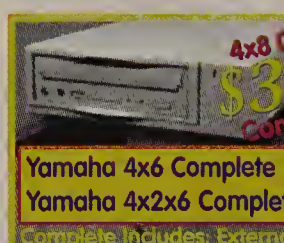

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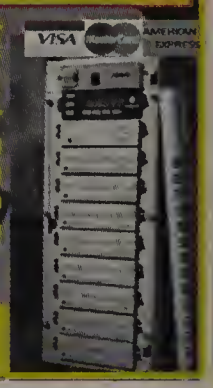

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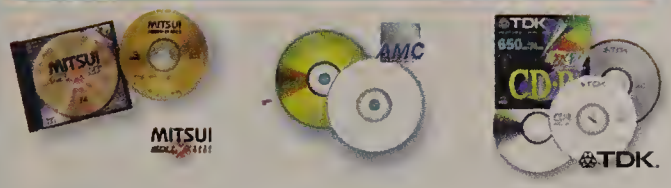

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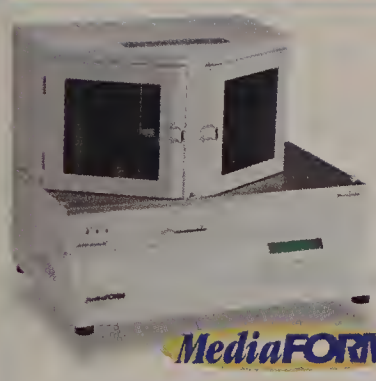

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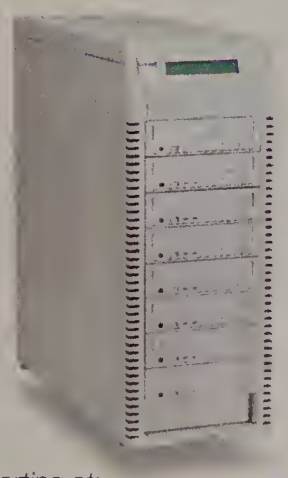

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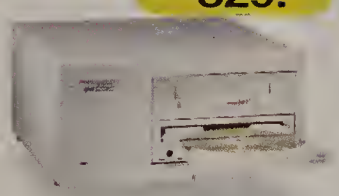

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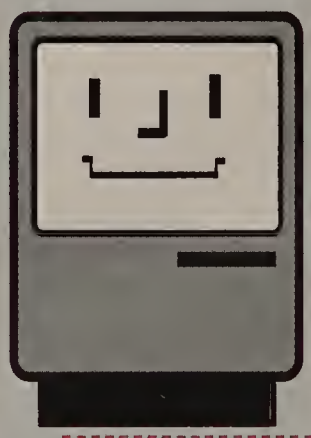

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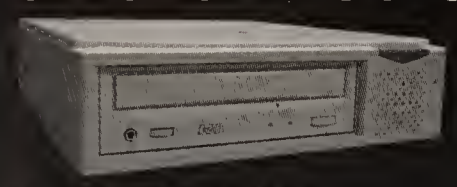

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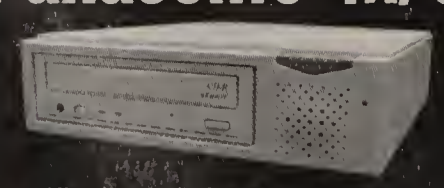

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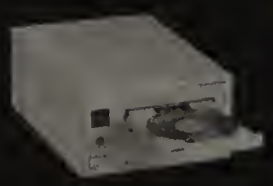

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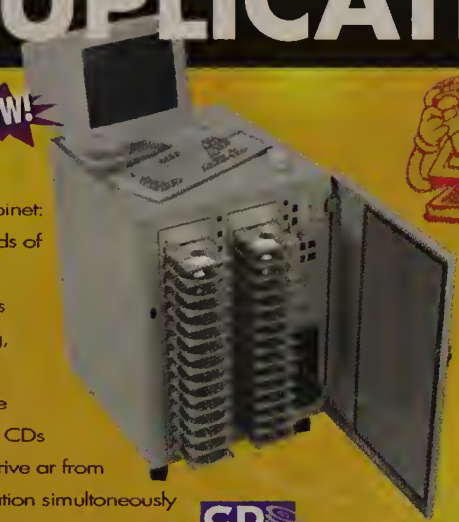

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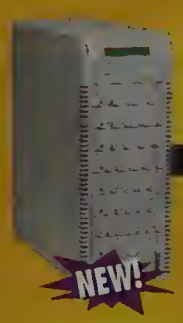

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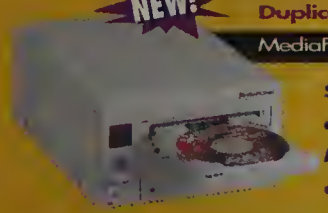

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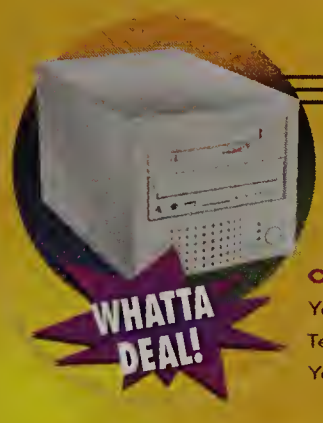

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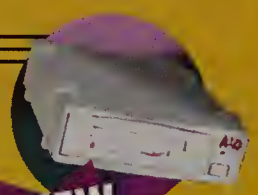

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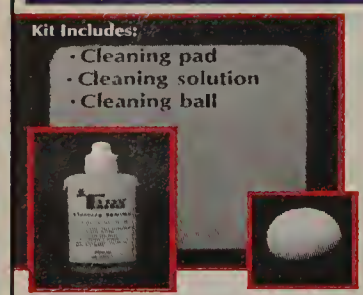

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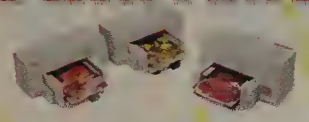

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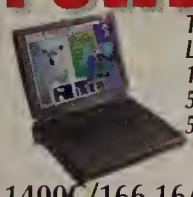

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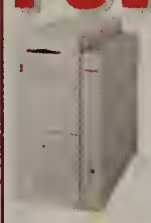

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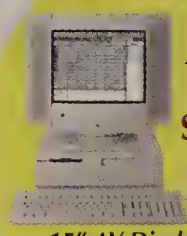

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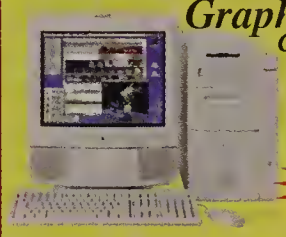

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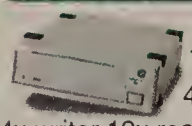

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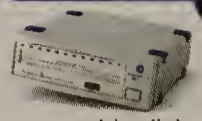

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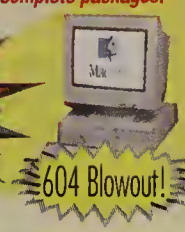

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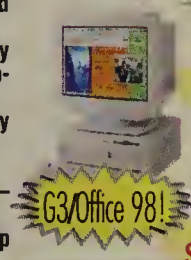

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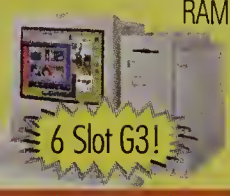

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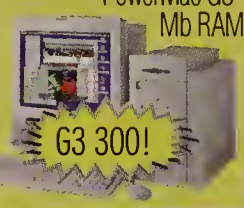

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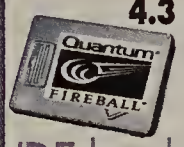

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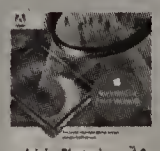
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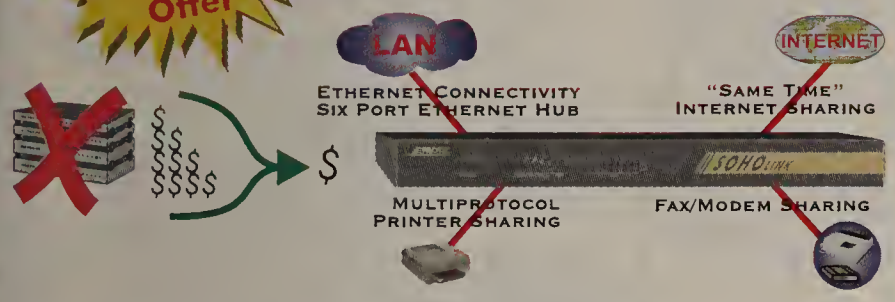

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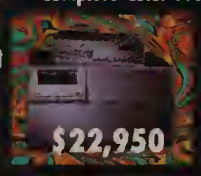

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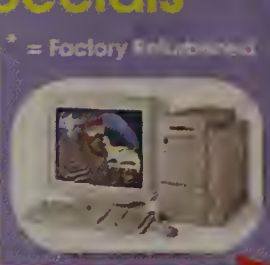

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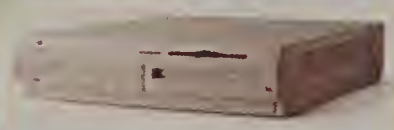

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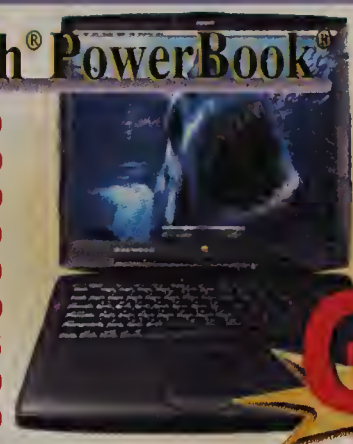

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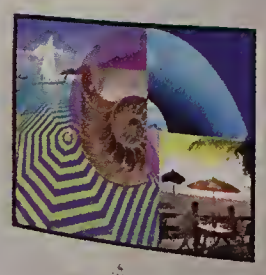

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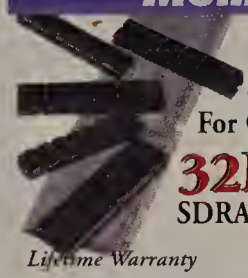

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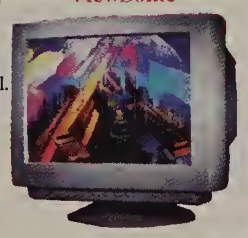

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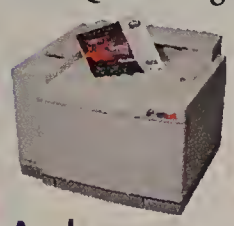

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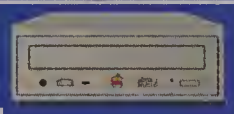

Apple 300i+ (2x)	$49
Apple 600i (4x)	$79
CyberDrive 24x	$99
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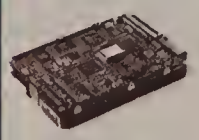

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G3/233 MT	32/4/24xCD/L2/Modem	1999/59
G3/299 OT	32/4/24xCD/Zip	1699/59
9600/350	64/4G9/24xCD/L2/Zip	2799/97
9900/300	64/4G9/24xCD/L2/Zip	2299/79
9600/300	32/4G9/24xCD/Zip	1999/99

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4400/200	16/2GB/CD	995
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6500/300	64/4G9/CD	1199/42
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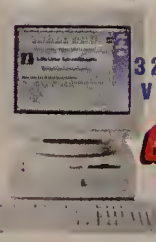

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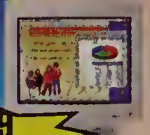

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	Syjet 1.5GB & Cartridge Ext.	299
	Syjet 1.5G9 & Cart. House Ext.	279
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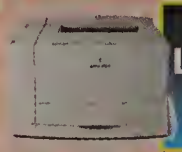

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$1850

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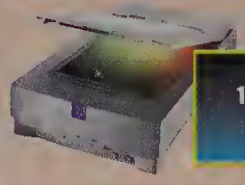

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MODEMS		
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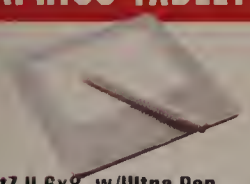

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Cheetah 8.0GB 7.5ms	899	899
Cheetah 18.0GB 6.7ms	1550	1699
Barracuda 18 18.2GB 7.1ms	1359	1459
23GB 13ms	1299	1425

IBM

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Radius	Thunder TX 1152	899
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Radius	PhotoDV w/FireWire	439
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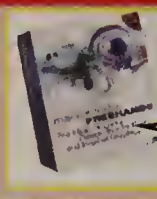

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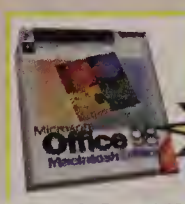

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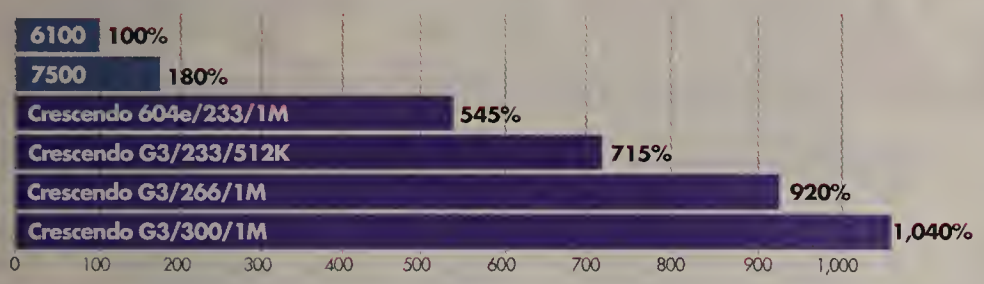

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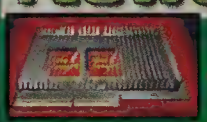

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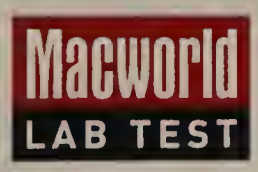

The Desktop Critic

by David Pogue

Goofus International and Gallant Microsystems

HOSTILE OR CHARMING: WHICH KIND OF SOFTWARE COMPANY ARE YOU?

DO YOU REMEMBER reading *Highlights for Children* as a kid—or having it read to you? Your mom would recite the magazine's preschooler-friendly lumps of moral and intellectual fiber, which were all done up in simple line drawings and noun-verb sentences.

I was deeply affected by one *Highlights* feature in particular: "Goofus and Gallant." In successive panels, you'd see how two young boys—a surly punk named Goofus and an angelic tot named Gallant—reacted to the same social situation. You know: "Goofus spends his after-school hours smoking and throwing rocks at puppies. Gallant brings adult-literacy programs to underprivileged communities."

We won't dwell on the fact that *any* kid with a name like Goofus is obviously the offspring of psychotic parents and can be forgiven for having antisocial tendencies. Instead, let's all agree that the world has too few Gallants and too many Goofuses.

I was installing some crummy software the other day, wishing there were a similar primer for *software companies*. There isn't, to my knowledge, a magazine for parents of aspiring programmers to read to their offspring. Who's the role model for these kids—Bill Gates? Oh, great. How will they learn how software should behave in public?

Allow me to offer a tale of two companies: Goofus International and Gallant Microsystems. Ready, junior engineers? Brush your teeth, get under the covers, and have Mommy read *this* to you:

Goofus International ships its software on a CD—but prints the 56-digit serial number *on* the disc. Gallant Microsystems' programs don't require a serial number at all.

The Goofus installer requires you to restart the Mac after installation. Gallant's installer lets you know that the software was successfully installed but won't be available until *you* choose to restart.

GoofusWriter Pro won't launch without a bunch of extensions. GallantWrite runs—in 900K of RAM—even if the shift key was down at start-up.

Goofus saves $4.25 per copy by eliminating a printed manual. Every Gallant program, on the other hand, comes with a proofread, well-indexed, Mac-specific manual—*and* online help.

The designers at Goofus have been brainwashed by Microsoft. Their programs eat up screen space with rows and rows of microscopic, unlabeled tool-bar icons. Software from Gallant includes menu-command equivalents for *every* tool-bar icon—and the icons are labeled.

Goofus lavishly updates version numbers when only minor changes have been made. Gallant follows correct version-numbering etiquette, revising the first digit of a program's version number only when the *file format* changes, bumping up the first decimal place when new features are added, and adding a second decimal point for free updates.

Goofus charges $35 per tech-support call. You have to provide your credit-card number *before* speaking to a technician—even if you're calling to report a bug. Gallant Microsystems recognizes that professional, free phone help is one of the few remaining distinctions between commercial software and shareware.

At www.goofus.com, huge graphics, worthless Java applets, and things that blink make the site about as much fun to visit as a meat locker. At www.gallant.com, on the other hand, you'll find an attractive, clean, quickly downloaded design—no Java, no frames, no graphics the size of Tulsa—that includes a tech-support message board monitored by Gallant's staff.

Goofusware does the bare minimum. Gallant applications go the extra mile: drag-and-drop editing, contextual menus, and a Print One Copy command. And in dialog boxes, you can tab to jump forward, shift-tab to jump backward, hold down the ⌘ key to see keyboard shortcuts, and press ⌘-period to dismiss the box.

The Mac versions of Goofus products come out months after their Windows counterparts. At Gallant, the versions debut simultaneously. (Gallant's accountants have done the math, too: Mac fans buy proportionally more software than Windows users, and Gallantware is much more likely to be a major player in the less crowded Mac market.)

Goofus doesn't attend Macworld Expo. (And when it *does* go to trade shows, it makes its customers perform like chimps to qualify for free T-shirts.) Gallant makes a point of presenting a friendly face to its customers at trade shows and gives away cool freebies to all. **m**

DAVID POGUE (www.pogueman.com) is the author of *The Microsloth Joke Book* and *The Great Macintosh Easter Egg Hunt* (Berkley Books, 1998).

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